

VOLUME 9

Pages 2097 - 2346

UNDER SEAL PAGES 2335 - 2346

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

**Before The Honorable YVONNE GONZALEZ ROGERS, Judge**

EPIC GAMES, INC.,	)	
	)	
Plaintiff,	)	NO. C-20-5640 YGR
	)	
vs.	)	Thursday, May 13, 2021
	)	
APPLE, INC.,	)	Oakland, California
	)	
Defendant.	)	BENCH TRIAL
	)	
APPLE, INC.,	)	
	)	
Counterclaimant,	)	
	)	
vs.	)	
	)	
EPIC GAMES, Inc.,	)	
	)	
Counter-Defendant.	)	
	)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

APPEARANCES:

For Plaintiff:	CRAVATH, SWAIN & MOORE, LLP
	825 Eighth Avenue
	New York, New York 10019
<b>BY:</b>	<b>KATHERINE B. FORREST, ESQUIRE</b>
	<b>GARY A. BORNSTEIN, ESQUIRE</b>
	<b>YONATAN EVEN, ESQUIRE</b>

(Appearances continued.)

Reported By:	Diane E. Skillman, CSR 4909, RPR, FCRR
	Pamela Batalo-Hebel, CSR 3593, RMR, FCRR
	Raynee Mercado, CSR 8258, RMR, CRR, FCRR

TRANSCRIPT PRODUCED BY COMPUTER-AIDED TRANSCRIPTION

For Plaintiff:

CRAVATH, SWAINE & MOORE, LLP  
825 Eighth Avenue  
New York, New York 10019

**BY: LAUREN A. MOSKOWITZ, ESQUIRE  
JUSTIN C. CLARKE, ESQUIRE  
W. WES EARNHARDT, ESQUIRE  
BRENDAN BLAKE, ESQUIRE  
JIN NIU, ESQUIRE**

For Defendant:

GIBSON, DUNN & CRUTCHER  
333 South Grand Avenue  
Los Angeles, California 90071

**BY: RICHARD J. DOREN, ESQUIRE  
DAN SWANSON, ESQUIRE  
CYNTHIA RICHMAN, ESQUIRE  
RACHEL BRASS, ESQUIRE  
ARPINE LAWYER, ESQUIRE**

GIBSON, DUNN & CRUTCHER, LLP  
2001 Ross Avenue, Suite 1100  
Dallas, Texas 75201

**BY: VERONICA S. MOYE, ESQUIRE**

PAUL WEISS RIFKIND  
WHARTON & GARRISON LLP  
2001 K STREET, NW  
Washington, DC 20006

**BY: KAREN DUNN, ESQUIRE  
JESSICA E. PHILLIPS, ESQUIRE**

For Defendant:

PAUL WEISS RIFKIND  
WHARTON & GARRISON LLP  
943 Steiner Street  
San Francisco, California 94117

**BY: ARPINE LAWYER, ESQUIRE**

**Defendant's Witnesses:****Page****Vol.****Hitt, Lorin**

Direct Examination by Ms. Richman (resumed)	2107	9
---	------	---

Cross-Examination by Mr. Even	2161	9
-------------------------------	------	---

Redirect Examination Ms. Richman	2226	9
----------------------------------	------	---

Recross-Examination by Mr. Even	2237	9
---------------------------------	------	---

Further Redirect Examination by Ms. Richman	2247	9
---	------	---

**Cragg, Michael**

Direct Examination by Mr. Even	2246	9
--------------------------------	------	---

Cross-Examination by Mr. Swanson	2290	9
----------------------------------	------	---

Redirect Examination by Mr. Even	2331	9
----------------------------------	------	---

Further Redirect Exam. by Mr. Even (sealed)	2335	9
---	------	---

Recross-Examination by Mr. Swanson (sealed)	2339	9
---	------	---

Further Redirect Examination by Mr. Even	2341	9
--	------	---

**Plaintiff's Exhibits:****Page****Vol.****Defendant's Exhibits:**

1 THURSDAY, MAY 13, 2021

8:04 a.m.

2 P R O C E E D I N G S

3 **THE CLERK:** Calling Civil Action 20-5640, Epic Games,  
4 Inc., vs. Apple, Inc.

5 Counsel, please state your appearances. And let me turn  
6 on the mics here. Okay. Table mics are on.

7 **MS. FORREST:** Good morning, Your Honor. Katherine  
8 Forrest for Epic.

9 **MR. EVEN:** Good morning, Your Honor. Yonatan Even  
10 for Epic.

11 **MR. NIU:** Good morning, Your Honor. Jin Niu for  
12 Epic.

13 **MR. CARVAJAL:** Good morning, Your Honor. Alex  
14 Carvajal for Epics.

15 **THE COURT:** You're new, Mr. Carvaja. I haven't seen  
16 you before.

17 **MR. CARVAJAL:** I was here briefly yesterday,  
18 Your Honor.

19 **THE COURT:** Welcome to the courtroom.  
20 Mr. Sweeney, good morning.

21 **MR. SWEENEY:** Good morning, Your Honor.

22 **THE COURT:** And, Mr. Rudd, good morning to you, sir.

23 **MR. RUDD:** Good morning.

24 **THE COURT:** On the Defense side.

25 **MS. RICHMAN:** Good morning, Your Honor. Cynthia

1 Richman for Apple.

2 **MS. PHILLIPS:** Good morning, Your Honor. Harry  
3 Phillips for Apple.

4 **THE COURT:** Mr. Phillips, I believe you're new as  
5 well; correct?

6 **MS. PHILLIPS:** Yes. That's right.

7 **THE COURT:** Welcome to the courtroom. Good morning.

8 **MS. DUNN:** Good morning, Karen Dunn for Apple,  
9 Your Honor.

10 **THE COURT:** Good morning, Ms. Dunn.

11 **MS. DUNN:** With us at counsel table is Heather  
12 Grenier from Apple.

13 **THE COURT:** Welcome back. Good morning.

14 **MR. DOREN:** Good morning, Your Honor. Richard Doren  
15 for Apple.

16 **THE COURT:** Good morning.

17 And good morning, Mr. Schiller.

18 **MR. SCHILLER:** Good morning, Your Honor.

19 **THE COURT:** In the gallery then we have -- today is  
20 Thursday, I believe. Ms. Lopatto from *The Verge*.

21 **MS. LOPATTO:** Good morning.

22 **THE COURT:** Ms. Atkins from *Law360*. Good morning.

23 From the class counsel, we have Mr. Harrington; correct?

24 **MR. HARRINGTON:** Good morning, Your Honor.

25 **THE COURT:** Good morning, sir.

1 And then I have in the back over there Mr. Spalding; yes?  
2 No.

3 **MR. ELTISTE:** No. Mr. Eltiste.

4 **THE COURT:** Eltiste, yes. Thank you.

5 And we have our witness and Ms. lawyer.

6 **MS. LAWYER:** Good morning, Your Honor.

7 **MS. FORREST:** Your Honor, I'm not sure if we  
8 introduced again Mr. Sweeney this morning or not.

9 **THE COURT:** I said "good morning" to him.

10 **MS. FORREST:** You did. I apologize.

11 **THE COURT:** Right, Mr. Sweeney?

12 **MR. SWEENEY:** Yes, Your Honor.

13 **THE COURT:** I want to make sure no one thinks I'm not  
14 saying good morning to them.

15 Are there any issues to address on the record this  
16 morning? Ms. Forrest?

17 **MS. FORREST:** We don't have any housekeeping matters  
18 this morning, Your Honor.

19 **MR. DOREN:** None here, Your Honor.

20 **THE COURT:** All right. And let's go ahead.

21 Mr. Hitt or Professor Hitt, I see you there in the  
22 gallery. If you want to come back, please. Why don't I -- I  
23 was waiting for Mr. Bornstein to get back. Will he be in the  
24 courtroom later this morning?

25 **MS. FORREST:** Your Honor, he is back at our trial

1 site. He can be here if you need him for something.

2 **THE COURT:** Let me just -- let me just say something  
3 here given that it impacts the rest of the trial, but it also  
4 impacted Mr. Bornstein. I saw him earlier, so I thought he  
5 was going to be here.

6 The plaintiffs provided me with three case cites at the  
7 end of yesterday. I thought they related to market definition  
8 and instead it related to the issue of witnesses talking to  
9 counsel during break.

10 I have the following to say with respect to that and want  
11 to make clear what my point was to Mr. Bornstein.

12 There is no Federal Rule of Evidence, no Federal Rule of  
13 Civil Procedure or Criminal Procedure that mandates that a  
14 witness cannot talk to their lawyers during a break. It is  
15 the trial court that has broad discretion to make a  
16 determination whether or not that's appropriate.

17 In fact, generally during a pretrial conference, I  
18 frequently have lawyers ask me what my practice is, and I  
19 suspect they ask because trial judges have different  
20 practices.

21 In my view, I am constantly -- at the end of any  
22 examination before a break, I assess whether it is appropriate  
23 or not to instruct a witness not to talk to parties or  
24 counsel, and I do that on a daily basis. I do that and have  
25 done that for years. That is the reason why I instructed Lori

1 Wright specifically not to talk to anyone because she was  
2 right in the middle of an examination, although I did not  
3 instruct her that she could not talk to her lawyer.

4 The case cites that were provided to me by the plaintiffs  
5 say nothing that disagrees with that assessment. There is a  
6 common law rule, and the reason is that trial judges do, in  
7 fact, have discretion. That's what the cases stand for.

8 In *Charlotte's Office Boutique vs. CAR*, the Ninth Circuit  
9 upheld a court's cautioning of a fact witness. That's because  
10 the court has discretion.

11 The same with respect to *U.S. vs. Sandoval*. The trial  
12 court, Court of Appeals said, "may prohibit communications."

13 In *Perry vs. Leeke*, the Ninth Circuit said -- actually,  
14 that was the Supreme Court -- that it's entirely appropriate  
15 for a trial judge to decide. "The cross-examination is more  
16 likely to elicit truthful responses if it goes forward without  
17 allowing the witness the opportunity to consult with third  
18 parties, including his or her own lawyer."

19 I frequently caution lawyers not to coach their witnesses.  
20 It is the reason why I do not allow objections, speaking  
21 objections, because I find that the way that lawyers  
22 frequently try to coach their witness are with those speaking  
23 objections, and I do not allow them.

24 None of those cases say I don't have discretion. The  
25 reason why I wanted to say this with Mr. Bornstein is that I



1 certainly did not see any prejudice or harm when I had a  
2 seasoned expert witness who was testifying as to opinions, had  
3 written testimony, had been deposed for hours, being  
4 cross-examined by another seasoned antitrust lawyer. Nothing  
5 in that suggested to me that I needed an instruction for that  
6 particular witness. I don't see any prejudice. I don't see  
7 any harm.

8 So if you think going forward that you would like an  
9 instruction, please ask me so I that I can consider whether it  
10 would be appropriate.

11 Ms. Richman, you may proceed.

12 **MS. FORREST:** Might I respond, Your Honor?

13 **THE COURT:** As to whether or not I have discretion?

14 **MS. FORREST:** Might I respond to the statement that  
15 Your Honor just made?

16 **THE COURT:** Okay, Ms. Forrest.

17 **MS. FORREST:** Your Honor, we would respectfully  
18 disagree with Your Honor's reading of the case law. We think  
19 that the Supreme Court has made it clear that at the heart of  
20 the adversarial process is that when a witness has gone on to  
21 cross-examination, that they should no longer be conferring  
22 with counsel. It doesn't require, we believe, a Rule of Civil  
23 Procedure for that to occur. We believe that that is set  
24 forth in Supreme Court precedent, and there is no exception  
25 that I'm aware of where there has been conferring that has

1       been allowed of that type.

2           We do believe that it's prejudicial to have coaching of  
3       witnesses during the pendency of a cross-examination, and we  
4       would ask for a standing order in that regard, Your Honor.

5           **THE COURT:** Any objection?

6           **MR. DOREN:** Cross-examination, Your Honor, no.

7           **THE COURT:** All right. That will be the order of  
8       this trial. Proceed.

9           **MS. RICHMAN:** On the subject of market definition,  
10       Professor Hitt is going to be turning to that shortly and  
11       talking about the evidentiary basis for Apple's proposed  
12       market definition, but I did want to circle back and say on a  
13       basic level, we agree with what Mr. Bornstein said yesterday,  
14       that really the heart of the matter comes from *Brown Shoe*,  
15       although very gated.

16           It is true that the modern case law continues to hold that  
17       plaintiffs have the burden of establishing the relevant  
18       product market encompasses all reasonable substitutes. That's  
19       reaffirmed in *Microsoft*. It's reaffirmed as recently by the  
20       Supreme Court in *Amex* which talks about *Brown Shoe*.

21           And then I also would suggest, Your Honor -- you probably  
22       already have looked at this -- but the Model ABA Jury  
23       Instructions for civil antitrust trials contain a very, you  
24       know, crisp summary of the basic test, recite the *Brown Shoe*  
25       factors, and also emphasize the test is a practical one with

1 reference to the actual behavior of buyers and marketing  
2 efforts of sellers. I have a copy of that, if you would like.

3 **THE COURT:** I don't need it. Thank you.

4 **MS. RICHMAN:** Okay. Thank you.

5 **THE COURT:** Proceed.

6 You are still under oath as a reminder. And good morning.

7 **THE WITNESS:** Good morning.

8 **THE COURT:** Proceed.

9 **MS. RICHMAN:** May I proceed, Your Honor?

10 **THE COURT:** You may.

11 **LORIN HITT,**

12 called as a witness for the Defendant, having been previously  
13 duly sworn, testified further as follows:

14 **DIRECT EXAMINATION (resumed)**

15 **BY MS. RICHMAN:**

16 **Q.** Professor Hitt, I think where we left off yesterday, we  
17 were talking about your analysis of competitive effects. Is  
18 that your recollection as well?

19 **A.** That sounds right.

20 **Q.** Okay. Well, let's just do a brief recap.

21 Can we have slide 4, please.

22 So, Professor Hitt, we talked about this slide yesterday,  
23 and I believe you indicated it summarizes your findings on  
24 output changes in the relevant market for digital game  
25 transactions and for all App Store transactions as well.

1 Could you just walk the Court through this again.

2 **A.** Sure. So these are the summary statistics on the period  
3 on some of those graphs you saw earlier. At the top I report  
4 the growth in game transactions and the growth in revenue for  
5 game transactions. These are 1200, 2600 percent. Those  
6 compare favorably to the overall U.S. spending on digital game  
7 transactions, which is 448 percent, which is about six times  
8 slower than the growth in game transactions in revenue.

9 You can also do the same kinds of calculations for all  
10 apps, and you get numbers, you know, 500 percent growth in  
11 transactions and 3700 percent growth in revenue indicating  
12 there is substantial revenue in transaction growth and  
13 therefore overall output growth in this market, regardless of  
14 whether you define it as game transactions or all app  
15 transactions.

16 **MS. RICHMAN:** Your Honor, I would like to say I was  
17 remiss in not mentioning this yesterday, but all of the  
18 findings in Professor Hitt's slide are supported by citations  
19 to exhibits that have been admitted by stipulation into the  
20 record, and I'm happy to read those out loud as we go along as  
21 they are in microscopic font here.

22 **THE COURT:** I can read them.

23 **MS. RICHMAN:** Okay.

24 **THE COURT:** And if you think you need to read them  
25 for purposes of the record, that's up to up.

1           **MS. RICHMAN:** Okay. Thank you, Your Honor.

2           **Q.** Okay. Well, let's jump forward then to our discussion of  
3 prices which I believe you indicated was another indicator of  
4 market outcomes; is that right?

5           **A.** That's correct.

6           **Q.** Okay. Can we go to slide 9, please. Can you just remind  
7 the Court what analysis you did on commission rates?

8           **A.** Yes. So there were four general areas of information I  
9 discussed regarding prices. So I discussed Apple commission  
10 rates, the 30 percent. It's been steady or generally falling.  
11 For game transactions, it's generally been steady. For all  
12 app transactions, it's steady or falling.

13           I discussed competitor commission rates, the commission  
14 rates in other comparable app stores that sell games, and  
15 those tend to be similar, for the most part.

16           I talked a bit about the commissions paid by Epic for the  
17 distribution of their own games through these stores, and they  
18 pay generally the posted rate at around 30 percent with a  
19 couple of exceptions.

20           And then finally I think where we left off last time we  
21 were talking about effective commission rates which are  
22 essentially the commission rates that you get when you  
23 consider some transactions are free and other transactions are  
24 paid, and when you average them together, you get what I'm  
25 calling an effective commission rate.

1 Q. And what did you find when you looked at the average  
2 commission rate for in-game purchases?

3 A. I think should we go to the next slide.

4 Q. Yes. Let's go to slide 15, please.

5 A. Okay. So this was -- this was the slide on game downloads  
6 where you see the average commission rate going down. When  
7 you talk about in-game purchases, the average commission rate  
8 is generally steady.

9 Q. Can we go to slide 16, please.

10 So this shows -- can you explain what this slide shows,  
11 Professor Hitt?

12 A. So this is a -- I think one of the more interesting  
13 analyses that I did as part of the analysis of prices. So  
14 this graph shows over time -- that's the horizontal axis and  
15 the vertical --

16 THE COURT: Professor, you really are going to have  
17 to slow down.

18 THE WITNESS: Okay.

19 So horizontal axis is the passage of time. The vertical  
20 axis is either the price charged for the game, which is set by  
21 developers, or the commission paid to Apple.

22 The green line is the price charged by developers.

23 The blue line is the commission that generates.

24 Now, keep in mind that Apple's commission has been steady  
25 at 30 percent for these types of transactions, and what you

1 see over time is that the -- the commission actually in dollar  
2 amounts per transaction has been steadily rising over time, up  
3 to on the order of three dollars per transaction.

4 **BY MS. RICHMAN:**

5 **Q.** Does that mean that Apple's commission has been rising on  
6 in-game purchase transactions?

7 **A.** No. And that's the interesting thing. What is driving  
8 this is that developers have been able to charge higher prices  
9 for in-game transactions over time. The net effect is that  
10 they're paying a higher commission; that they're also  
11 generating greater revenue per transaction.

12 This is a good thing. Developers are creating more value  
13 for consumers, and they're able to charge more, and they're  
14 earning more revenue as a result. Apple, of course, because  
15 its commission has been steady, also has been earning an  
16 increased commission on those transactions.

17 **Q.** And is that why the green line in this slide is going up?

18 **A.** That's correct.

19 **Q.** Okay. Is Epic one of the developers that has raised its  
20 prices over time?

21 **A.** Yes.

22 **Q.** Can we have slide 17, please.

23 And can you explain what this slide shows?

24 **A.** So this slide is similar to the previous one. Passage of  
25 time on the horizontal axis and vertical axis is the average

1 and median prices charged by Epic for in-app in-game  
2 purchases.

3 And what you see is that it's broadly rising over the time  
4 period, but when *Fortnite* was released, there is a substantial  
5 increase in the median and the average in-game transaction  
6 price. Effectively the median doubled from five to ten  
7 dollars.

8 **Q.** And can you explain the dotted dropdown line on this  
9 slide?

10 **A.** That's -- that's the release of *Fortnite* on iOS.

11 **Q.** Okay. And then do you have an estimate as to how much the  
12 price of *Fortnite* increased after that?

13 **A.** Again, the median doubled on in-app transactions.

14 **Q.** On *Fortnite* as well?

15 **A.** On *Fortnite*.

16 **Q.** Okay. Great.

17 What does this pricing information, taken as a whole, tell  
18 you about whether Apple's conduct has had any anticompetitive  
19 effects on in-game transactions?

20 **A.** Well, what it says is that Apple's prices have essentially  
21 been constant for in-game transactions, and developers are  
22 making greater use of this service, and they're being -- they  
23 are able to charge higher prices, so this does not suggest  
24 that Apple has raised prices, and it does suggest that game  
25 developers and consumers have been getting more value from



1 these transactions.

2 **Q.** And we talked about the fact that you looked at the data  
3 for in-game transactions. Did you also do a similar analysis  
4 for all iOS app transactions?

5 **A.** Yes. The data can be cut to games which we've been  
6 discussing, but you can also do it for all app transactions,  
7 and I did that analysis.

8 **Q.** And what did you find when you did that analysis?

9 **A.** So generally for all apps, the commission rates are -- are  
10 steady or declining and the decline is due to the changes in  
11 app policies regarding certain kinds of transactions.

12 **Q.** So that's for initial downloads. Did you also look at  
13 average commission rate for in-app purchases for all apps?

14 **A.** Yes. And you get a similar -- in particular, you get a  
15 declining commission there as well, steady or declining.

16 **Q.** Based on your analysis of the evidence in this case, do  
17 you have an opinion about how the average commission rate will  
18 change in the future, if at all?

19 **A.** So in general, you would expect the average commission  
20 rate paid to decline for at least two reasons. One is the  
21 charges related to subscriptions are -- would have a long-term  
22 effect because increasingly developers are finding ways to  
23 monetize with subscriptions rather than other sources, and  
24 that would make them subject to lower commissions upon  
25 subscription renewal.

1 And then there is a small business program, small business  
2 developer program, which has lowered commissions to 15  
3 percent. That's been rolling out this year. That as more  
4 developers take advantage of that program, you would expect  
5 commission rates to decline as well.

6 **Q.** Has Epic taken advantage of -- or if Epic was still in the  
7 App Store with its present monetization strategies, do you  
8 understand whether it could have taken advantage of one of  
9 these lower commission rate models?

10 **A.** There is always the potential in particular to offer  
11 subscriptions, and so Epic could have taken advantage of  
12 subscriptions, and I believe there are some types of  
13 subscription products available now, but that's something they  
14 can do.

15 **Q.** And, Professor Hitt, did Dr. Evans analyze whether Apple's  
16 conduct has increased prices over time?

17 **A.** He has done very little analysis of Epic's prices. I  
18 think he did one calculation of an effective commission rate.

19 **Q.** So did he calculate an effective commission rate like the  
20 ones that you calculated, or is it something different?

21 **A.** He did something different. So in particular, the --  
22 the -- one of the primary differences is he omitted free  
23 transactions from his calculation. His calculation does find  
24 the commissions are going down, but the magnitudes are very  
25 different because he does not include free transactions.

1 Q. I think you said Dr. Evans concludes that the commission  
2 rate is going down, the average commission rate is going down  
3 or the effective commission rate, in his terms?

4 A. Yes. I believe that's consistent with his discussion.

5 Q. And do you have at the top of your head his average  
6 commission rate?

7 A. I believe he calculated -- in 2019 I believe the average  
8 commission rate is 27.7 percent.

9 Q. Okay. And do you believe it's a problem that Dr. Evans  
10 excluded free apps from his analysis?

11 A. Yes, I do.

12 Q. And why?

13 A. Well, free apps are an important part of what the App  
14 Store provides, and many developers, in particular game  
15 developers, take advantage of the ability to offer free apps,  
16 at least on initial download. And so to exclude that I think  
17 misses a significant component of the services that are  
18 provided by the App Store and makes the commission rates seem  
19 higher than they really are.

20 Q. Could we have slide 18, please.

21 Does this slide show a comparison to Dr. Evans' effective  
22 commission rate calculation?

23 A. Yes, it does.

24 Q. And can you summarize what you have shown on this slide?

25 A. Sure. So the red bar is Dr. Evans' calculation, which is

1 essentially what he did in 2019. I believe that specific  
2 number is reported in one of his reports. And I simply did  
3 the similar calculation but restricted to game transactions in  
4 one case and including free apps.

5 If you do that, the number becomes 8.1 percent. If you go  
6 to the far left, if you do it for all app transactions, which  
7 I believe is consistent with his 27.7, the number falls to  
8 4.7. This difference is entirely driven by including free  
9 transactions. That's what's making the difference, and this  
10 presentation is intended to highlight the fact that when you  
11 consider free transactions, the effective commission rate is  
12 lower. And I think that's important to consider.

13 **Q.** Last question on pricing before we move to a new topic.

14 Is any of the price evidence you have seen consistent with  
15 Apple raising prices after 2010 when Dr. Evans claims Apple  
16 gained monopoly power?

17 **A.** No. Apple's commissions have been steady or declining  
18 throughout for game transactions, that's true. It's also true  
19 for -- and perhaps more true for all app transactions as they  
20 take advantage of some of these commission reductions that  
21 occurred over the last few years.

22 **Q.** So, Professor Hitt, we've talked about output. We've  
23 talked about pricing.

24 **THE COURT:** Can I just ask, all transactions, these  
25 are all downloads plus all in-app transactions?

1           **THE WITNESS:** Yes. That's -- that's -- Dr. Evans'  
2 approach is to mix the two together, and so I followed that  
3 approach in this calculation. So that's -- yes, it's all  
4 apps. All apps, all downloads, and all in-app purchases.

5           **THE COURT:** Thank you.

6           **BY MS. RICHMAN:**

7           **Q.** Professor Hitt, we've talked about output, we've talked  
8 about pricing. What is the third indicia of competitive  
9 effects that economists typically look at to evaluate whether  
10 conduct has a pro or anticompetitive effect?

11          **A.** So you can also look at quality change, and in particular,  
12 if you believe that a firm is engaged in anticompetitive  
13 conduct, what they might do is fail to innovate and quality  
14 would decline.

15          **Q.** And is quality something that economists typically  
16 analyze?

17          **A.** Yes. It's an important part of thinking about output, is  
18 the quality of that output.

19          **Q.** Slide 19, please.

20               What economic evidence did you consider to assess whether  
21 Apple has reduced quality?

22          **A.** So there is a number of different ways of going about it.  
23 Quality is a little more difficult to directly measure, but  
24 you can make some inferences from available data. So one  
25 thing you could look at is the same measures that indicate

1 increasing output provide information about increasing  
2 quality. Developers are increasingly -- developers and  
3 consumers are increasingly choosing to transact in these  
4 forms. The ability to generate revenue from the developer has  
5 increased over time. They've been able to raise their prices  
6 because consumers perceive the value in the products that  
7 they're offering. So that's -- that's a quality improvement.

8 There is also a variety of qualitative metrics you can  
9 consider, so you can think about things like the fact that the  
10 innovations in the iOS platform have enabled new types of  
11 games to appear that essentially could not have been available  
12 years ago. I believe Mr. Sweeney himself testified that  
13 *Fortnite* could not have been delivered in its current form on  
14 an iOS platform with previous technology.

15 You could also look -- and that's -- that can be extended  
16 more broadly. There are a variety of innovations that Apple  
17 has made to the App Store and to the iOS platform that has  
18 made the types of products available and the quality of those  
19 products has increased -- has enabled developers to increase  
20 the quality of the products they're offering because of the  
21 technological support of the iOS platform.

22 **Q.** You mentioned, I believe, that you could use empirical  
23 quantitative data to make -- draw conclusions about quality;  
24 is that correct?

25 **A.** That's correct.

1 Q. And so did you use the 60-billion-transaction observations  
2 produced by Apple in this case to draw any conclusions about  
3 quality?

4 A. So you can make the inferences that I discussed before  
5 that the -- these transaction prices are increasing, the  
6 volume of transactions are increasing. There is also other  
7 data that can be used to indicate, for example, that in games  
8 like *Fortnite*, the -- well, at least quality comparison sense,  
9 that the Apple App Store provides a greater level of  
10 monetization per minute played, for instance, than other  
11 games -- than other platforms.

12 Q. What about innovation? Has Apple reduced the speed of  
13 innovation in the game transaction market, in your opinion?

14 A. There's nothing to suggest that that is the case. There  
15 has been a dramatic improvement in the capabilities of the iOS  
16 platform due to Apple's investments, and that has improved the  
17 types of services that developers can access and the types of  
18 games that can be made available, and that has increased the  
19 quality of output in the games transaction market.

20 Q. Could we have slide 20, please.

21 And have you observed evidence of innovative services  
22 entering the game market?

23 A. Yes. One of the -- the relatively recent innovations, but  
24 as I understand there is a variety of testimony that these are  
25 growing rapidly, are these game streaming services. These

1 services enable you to stream from a centralized server games  
2 that are meant for consoles or PCs to a device, and including  
3 the web browser on your iOS device.

4 So if you would like to be able to play some relatively  
5 high-end games, one of the ways you can do so is you can  
6 stream it through a web browser. And there are services like  
7 Google Stadia that also sells games. Microsoft xCloud -- I  
8 believe Ms. Wright talked about that as well -- that went to  
9 open beta very recently. Amazon Luna has been in beta for a  
10 couple of months now. And we heard the discussions from, I  
11 believe, Mr. Patel from Nvidia was talking about the rapid  
12 growth of GeForce Now that enables consumers to stream games  
13 that they have purchased off, for example, Steam to various  
14 devices, including through a web browser.

15 **Q.** From your perspective as an economist, how would you  
16 characterize the evolution of these services over time?

17 **A.** I think at least the testimony we've heard is that these  
18 services are rapidly improving and rapidly increasing in  
19 volume. I believe the Nvidia folks testified to that.  
20 Professor Athey also indicated that as well.

21 **Q.** Let's switch topics a bit.

22 Did you hear Dr. Evans and Professor Athey's testimony on  
23 user lock-in?

24 **A.** Yes, I did.

25 **Q.** And they testified their opinion is that iPhone users are



1 locked in to iPhones; is that correct?

2 **A.** That is correct.

3 **Q.** Is that a conclusion you agree with?

4 **A.** No, for -- for several different reasons.

5 **Q.** Can you articulate those reasons, please.

6 **A.** Sure. So for one thing, consumers actually do switch.  
7 There is evidence that is, I believe, in the record and a  
8 variety of evidence that suggests that as many as 26 percent  
9 of people switch platforms when they're at a potential  
10 switching event.

11 Keep in mind, smartphones have a life cycle. Some people  
12 replace them faster than others, but at the end of that  
13 replacement interval, you have a choice to replace it with  
14 another device, and as many as 26 percent of people do.

15 There is other surveys that provide a range of numbers  
16 from that, anywhere from single digits to that 26 percent  
17 number. But people do indeed switch platforms when they can.

18 There is also a group --

19 **THE COURT:** Where is the data?

20 **THE WITNESS:** The data is cited in my report. One,  
21 the 26-percent number comes from an industry study by, I  
22 believe, Kantar. There is a number of other reports. I  
23 believe one of them is a sealed document that's a Google  
24 document that has a different figure in it, and I won't say  
25 anything more because I don't want to reveal anything I'm not

1 supposed to say. But there is a number of sources.

2 Dr. Evans has a number of sources as well in his report  
3 that I also quote, and what you see across them -- there is  
4 probably four or five -- you get numbers on the order of -- I  
5 think you can go as low as 4 and as high as 26 with many of  
6 them in the sort of low single digits.

7 **THE COURT:** Okay. Thank you.

8 **BY MS. RICHMAN:**

9 **Q.** So if you assume that, you know, the switching rate is  
10 somewhere in the middle of that range, in terms of number of  
11 devices per year or number of consumers a year, do you have a  
12 rough estimate as to what that works out to be?

13 **A.** So if you think about all the devices that are sold each  
14 year, there is something like 78 million smartphones sold a  
15 year, probably more now. So that's 78 million new possible  
16 choices. Many of those consumers will choose to buy the  
17 device, to stay within the ecosystem and the manufacturer  
18 they've chosen before, but some can switch.

19 Also there is a substantial number of new consumers.  
20 Another industry study indicated that as many as 21 percent of  
21 buyers are new to the market. So 78 million gives you both  
22 new buyers, potential switchers, and people who are just happy  
23 with their existing ecosystem. That is a lot of opportunities  
24 to make a different decision every year.

25 **Q.** Professor Hitt, are high rates of customer retention a

1 sign of high switching costs?

2 **A.** No. There's -- there -- it could be switching costs, but  
3 it's also plausible and likely that a lot of that is simply  
4 customer loyalty or preferences for different products: *I*  
5 *stick with the product I have because I like the product I*  
6 *have. And I'll continue to use that until, you know,*  
7 *something else changes.*

8 **Q.** And is that a factor that either Dr. Evans or  
9 Professor Athey considered in their analysis?

10 **A.** I'm not sure if they considered it or not. They generally  
11 view a lot of the factors I consider to be drivers of loyalty,  
12 they lump that into switching costs, and I think that's --  
13 that's just not the right way to think about it.

14 **Q.** And, Professor Hitt, you have, as we discussed yesterday,  
15 experience in the smartphone industry that predated this case.  
16 Do you -- are you aware of what smartphone makers do to  
17 potentially address any switching costs of the sort referenced  
18 by Dr. Evans and Professor Athey?

19 **A.** Yes. So as I mentioned, there is 78 million purchases up  
20 for grabs every year and the smartphone manufacturers have a  
21 lot of incentive to make that -- make it possible to switch  
22 between platforms because a lot of people already have an  
23 existing smartphone.

24 And so one of the things they do is they provide tools to  
25 make that process easy. Apple provides it. I believe Samsung

1 has a product. LG has a product. Google has a product. The  
2 goal of these products is to make it possible to switch  
3 between platforms as easily as you can.

4 **Q.** Do developers have a role in facilitating consumer  
5 switching?

6 **A.** Yes, they do. An important role.

7 **Q.** And can you describe the role of app developers in that  
8 facilitation?

9 **A.** Sure. I believe Dr. Evans and Professor Athey indicated  
10 that either switching apps, locating apps, or moving data from  
11 platform to platform is one of the things that might inhibit  
12 people from switching. Developers control, by their own  
13 choices, a lot of those costs. They can choose whether or not  
14 to develop for one or another platform, and in many -- in  
15 nearly all cases, the major apps are available on both  
16 platforms.

17 There is also services that they can provide that make  
18 that -- that type of movement easy. They can offer  
19 portability of content so they can have, you know, for  
20 example, a single sign-on account that allows you to transfer  
21 your information from one service to another. In some cases,  
22 they can offer portability of subscription content where I  
23 have one account and I can access it on multiple devices.

24 So developers do have a lot of control as to how difficult  
25 that switching process is. It does vary by developer, but

1 these services are available, and many of the large developers  
2 are on multiple platforms and many of them do offer these  
3 kinds of services.

4 **Q.** I think Professor Athey said that the cost of repurchasing  
5 apps is a significant switching cost. Is that a statement you  
6 agree with?

7 **A.** Generally no. If consumers did have to buy apps and pay  
8 up front for apps, in many cases that could be a cost, but if  
9 you look, for example, in the games market, the vast majority  
10 of games, for instance, are free to download and so they  
11 wouldn't be incurring those costs at all.

12 And, again, the developers who have taken advantage of any  
13 of those other types of services like common subscription and  
14 so forth, that wouldn't -- you wouldn't be typically paying  
15 for an incremental amount. You may need to switch your  
16 subscription in some cases, but you wouldn't be paying for a  
17 new download.

18 **Q.** Thank you, Professor Hitt.

19 Let's turn to market definition.

20 **THE COURT:** Can I ask on that last point, though,  
21 even if it's free to download, unless there's cross-platform  
22 play in games or cross-wallets in games, then if you haven't  
23 used all the money in your wallet on an app on an iOS device,  
24 then you can't use that or you better use it before you switch  
25 to an Android device because you won't be able to use it if

1 you switch to Android; right?

2 **THE WITNESS:** Yes. That's exactly right. And the --  
3 what I would add to that, however, is that's the call of the  
4 developer. Some developers facilitate that more. Some  
5 developers don't facilitate. But, yes, you're absolutely  
6 right.

7 **THE COURT:** All right.  
8 Proceed.

9 **MS. RICHMAN:** Thank you, Your Honor.

10 Let's have slide 21, please.

11 **Q.** Professor Hitt, what is the relevant product market in  
12 this case, in your opinion?

13 **A.** It's my opinion, and I think consistent with  
14 Professor Lafontaine, is the market for digital game  
15 transactions.

16 **Q.** And just to set the table, do you know what percentage of  
17 the App Store revenues are the result of game transactions?

18 **A.** The figure I recall is 62 percent of all revenue in the  
19 App Store relates to game transactions.

20 **Q.** And what framework did you apply to determine that the  
21 relevant market is digital game transactions and not iOS app  
22 distribution as Dr. Evans claims?

23 **A.** So the framework I used -- and I relied heavily on  
24 Professor Lafontaine -- is to look for substitutes for  
25 performing digital game transactions. So to look, Epic makes

1 a game. *Fortnite* is a game. They transact in the "games"  
2 category on the App Store. So then I looked at other services  
3 that provide the ability to access game transactions.

4 Professor Lafontaine indicated that it is perfectly  
5 appropriate and common to use the ability to substitute among  
6 these types of services as an indication that they are in the  
7 same market.

8 Now, in addition to that, this is a two-sided transaction  
9 platform. As a result, you have to think about who the  
10 entities are that are engaged in this type of substitution.  
11 In a two-sided market, you have to think about both sides,  
12 so -- and this follows Professor Schmalensee's discussion of  
13 two-sided platforms. You have to think about the substitution  
14 opportunities for developers on the one side and you have to  
15 think about the substitution possibilities for consumers on  
16 the other side and how these services are able to help them  
17 meet and perform transactions.

18 **Q.** And how did you go about doing that?

19 **A.** So you can look at a variety of data, both transactional  
20 data as well as market research data as well as qualitative  
21 data and documentary evidence that provides information about  
22 the extent to which developers can move across these plat --  
23 well, you first have to identify the platforms.

24 The second thing is you can look at how developers move  
25 across these platforms. And then third, you can look at how

1 consumers can move across these platforms, and that  
2 collectively gives you an indication of what the substitutes  
3 are.

4 **Q.** And in this slide, do you show your findings on the  
5 relevant transaction platforms in your opinion?

6 **A.** Yes. So this -- this is a -- by the way, this is a common  
7 way in which you depict two-sided markets so that's what this  
8 presentation is based on. I believe it's one, two -- seven --  
9 seven of them are here. There is 14 transaction platforms,  
10 including the App Store, that at least I've identified, and  
11 there are some more, but those are the major ones.

12 These are seven of the ones that I think are  
13 representative of the types of services you see, the ones tied  
14 to hardware, you know, such as Nintendo, Google Play which  
15 services the Android ecosystem, Steam which services the PC  
16 ecosystem, you have developer centric stores that also offer  
17 transactions for other products like EA Origin, App Store,  
18 Microsoft, Xbox Store. And, again, this is just illustrative.  
19 I have identified at least 14 other transaction platforms that  
20 could be relevant.

21 **Q.** And are all of these pathways, in your opinion, for  
22 connecting game developers on the one hand and consumers who  
23 want to buy a game on the other hand?

24 **A.** Yes. These -- these give you a variety of different ways  
25 in which consumers can meet up with developers to transact.



1 Some developers may only offer their products on some of these  
2 platforms which limits the choices for consumers on where they  
3 can transact. Others may make different choices and offer  
4 them lightly, in which case consumers can have many different  
5 choices. And then on the other side, you have the fact that  
6 consumers have many different devices which enables them to  
7 access transactions on these different platforms.

8 **Q.** Let's talk about developers, the developer side of the  
9 two-sided transaction platform.

10 Could we have slide 22, please.

11 Do developers substitute across game transaction  
12 platforms?

13 **A.** Yes, they do. They have a choice on where to offer their  
14 games and under what circumstances, and I think they do  
15 that -- there's documentary evidence that they do that in an  
16 informed way considering things like, you know, what are the  
17 customers on these various platforms; what's the potential to  
18 purchase their games; what tools the platforms provide to  
19 enable them to offer their -- their games there; the other  
20 services they might provide, technical support, marketing and  
21 promotion, those kinds of things; the capabilities of the  
22 platform, like the underlying technology; and then the cost,  
23 how much does it cost to develop, how much does it cost to  
24 transact.

25 **Q.** These are the factors that developers consider when

1 choosing which game transaction platform to transact on; is  
2 that what I heard you say?

3 **A.** Yes. We're able to identify specific evidence for these  
4 various points that developers consider these factors when  
5 choosing where to participate, and ultimately it's their  
6 choice based on their own, you know, business decision-making  
7 as to which platforms to offer their products.

8 **Q.** And I think you mentioned this also already, but do all  
9 developers necessarily choose to transact on all platforms?

10 **A.** No. There are -- you can empirically observe a large  
11 variety of choices. So you have developers like Niantic who  
12 offer Pokémon GO. That's a pretty much mobile exclusive  
13 because of the products they've chosen to offer. You have  
14 developers like Epic who offer their products on a variety of  
15 different platforms. There are other developers like that.  
16 You also have changes over time. So you can have four changes  
17 across games so developers might offer some games on some  
18 platforms and other games on other platforms. And, for  
19 example, again, Epic has made different choices. Some games  
20 are, for example, Xbox exclusive; others are offered broadly.  
21 Those decisions can change over time as well.

22 **THE COURT:** It would be hard to play a Pokémon GO  
23 with a console.

24 **THE WITNESS:** That is true. That's right. It is --  
25 because it relies specifically on alternative reality

1 technology, but, you know, for example, the developer could  
2 consider another type of game building on their intellectual  
3 property that might be amenable to other platforms. So it's  
4 always a choice, but, again, technology might be an important  
5 part of that choice for some developers. Maybe less so for  
6 others. I think the Pokémon GO folks are pretty high on that  
7 technological choice range.

8 **BY MS. RICHMAN:**

9 **Q.** Have you heard any testimony in this trial that reflects  
10 the fact that developers have these choices?

11 **A.** Yes.

12 **Q.** And do you recall what that was?

13 **A.** So there's testimony that indicates that these games were  
14 rolled out over different platforms over time and that  
15 developer -- in particular Epic but others have chosen to  
16 offer their games on different platforms in different times.

17 There is also other, for example, discussion, I believe in  
18 the Microsoft testimony, regarding the availability of  
19 different games at different times.

20 **Q.** And is one example of this choice Epic's initial decision  
21 to not make *Fortnite* available through Google Play?

22 **A.** Yes. Epic initially decided that they would use an  
23 alternative means to reach users of the Android platform.

24 They later decided -- I understand that it was in conjunction  
25 with Project Liberty -- to offer -- to begin offering their

1 games on Google Play.

2 **Q.** Does Apple place any restriction on developers' ability to  
3 develop applications for other game transaction platforms or  
4 any platforms?

5 **A.** No. I mean, in some -- in some platforms, exclusivity is  
6 a norm. Apple does not require any -- any exclusivity for  
7 games developed for iOS.

8 **Q.** Okay. Let's jump to the other side of the platform and  
9 talk about consumer substitution.

10 Did you assess consumer substitution?

11 **A.** Yes, I did.

12 **Q.** And what did you consider in your assessment of consumer  
13 substitution?

14 **A.** Well, the -- you can think of the process as sequential so  
15 first of all I looked at whether or not consumers have access  
16 to or use many different kinds of devices. That certainly  
17 facilitates it to the extent that some platforms specifically  
18 are focused on supporting certain kinds of devices. And so  
19 that -- that's a first step. You know, can consumers move  
20 across these platforms because they have the necessary  
21 hardware. That doesn't mean they can't acquire it and some  
22 do, but that's -- that was a consideration.

23 Then you can look at whether or not consumers use these  
24 multiple platforms to play games, and that use might be, you  
25 know, cross-game. Consumers might play different games on

1 different devices.

2 Or we have data that is a unique situation. Here we have  
3 data that indicate the extent to which consumers multihome.  
4 That is basically use multiple platforms even for the same  
5 game. And so we can look at where they are and how they  
6 allocate their time and their spending across different  
7 platforms.

8 And the Epic data is particularly useful for that. It's  
9 one of the unique things we have available here, is we can  
10 actually see how consumers go across platforms, at least for  
11 one game. But I wouldn't limit it to one game. It is also  
12 possible to do so for multiple games, and we have some  
13 evidence that is the case as well.

14 Finally, we can examine whether or not consumers move  
15 among these platforms when they have reason to do so. Now,  
16 keep in mind in the traditional substitution context -- I  
17 think Professor Lafontaine talked about this in her testimony  
18 as well -- when you're looking at, for example, substitution,  
19 you will like to see a price change that drives consumers to  
20 make different choices. We don't have those here. The prices  
21 have been generally steady for game transactions. So instead,  
22 it's possible, and I think Dr. Evans agrees, to look at  
23 situations where consumers have reasons to move among these  
24 platforms, and we can see if they are able -- willing and able  
25 to move across these platforms, again, consistent with them

1 being substitutes.

2 Q. And you refer to those as natural experiments?

3 A. Yes. They're natural experiments. Something happens in  
4 the world that you can use to evaluate the response and that  
5 can provide insight to the extent to which consumers, at least  
6 in this case -- consumers move among these platforms.

7 Q. Professor Hitt, is consumer-switching between games  
8 relevant to your analysis?

9 A. Yes. So one of the things we find is indeed consumers  
10 play the same game on multiple platforms, and that's really  
11 interesting. But it's also possible to move across games, and  
12 that makes it -- makes these platforms potentially  
13 substitutable, even if they are not playing exactly the same  
14 game, and there is many different variations of that. It  
15 might be exactly the same game. I think Ms. Wright testified  
16 that, for example, some platforms will offer something else  
17 derived from the same intellectual property, kind of like the  
18 answer to your question, Your Honor, about Niantic. And  
19 others might simply substitute among other games: *If I can't*  
20 *plate Fortnite, I'll play something else. I will play PUPG or*  
21 *something else that is interesting to me.*

22 Q. Okay. Let's start with the first item on this slide.

23 What evidence did you find that shows consumers own, use, and  
24 have access to multiple devices on which they can make digital  
25 game app transactions?

1     **A.** So there's -- there's a variety of survey information.  
2     Some of that survey information was done as part of this case  
3     by Professor Hanssens. Others have looked at, for example,  
4     device ownership. That's something that is of interest to  
5     sort of game industry analysts. And so there is those --  
6     those research studies as well.

7     **Q.** Your second point on this slide is that consumers  
8     multihome even for the same game, and I think you said this,  
9     but you analyzed this for *Fortnite*; correct?

10    **A.** Yes. That's one of the unique opportunities we have here  
11    is because we can observe the same consumer across multiple  
12    platforms, that's not something you normally are able to see.  
13    And so you can see whether or not -- again, how consumers  
14    allocate both their time and their spending across these  
15    various platforms, and we have detailed data on that.

16    **Q.** Would you like a water break, Professor Hitt?

17    **A.** Yes, I would. Thank you.

18           (Brief pause in proceedings.)

19    **BY MS. RICHMAN:**

20    **Q.** Could we have slide 24, please.

21    **A.** Okay.

22    **Q.** So can you -- a lot of numbers on this slide,  
23    Professor Hitt. Can you walk us through what this depicts.

24    **A.** So this is based on the *Fortnite* monthly transaction --  
25    monthly data, monthly -- it is done at a consumer level by

1 month. And what we did was we took this data and we counted  
2 the number of distinct user -- users that are available --  
3 that are listed for each of these platforms. Now, this isn't  
4 all the platforms, but it sort of cuts off at the major ones.

5 In addition, for each one of the platforms, I looked at of  
6 the consumers who use that platform -- let's pick iOS, for  
7 example; 115 million of them have adopted *Fortnite* on iOS --  
8 how many of them have also played on another platform. And in  
9 this case, of that 115 million users, about 36 percent --  
10 that's the number to the right at the top -- have played on  
11 another platform.

12 And as you can see, if you go down, you see numbers, you  
13 know, sort of in the range of 30 to 50ish percent for the  
14 number of users who are on one platform and use another, and  
15 this is done from each platform's perspective. So some people  
16 might be on multiple, but if it's iOS and at least one other,  
17 that would go into that 35.9 percent.

18 **Q.** Did you look at whether users who access *Fortnite* on iOS  
19 made paid transactions on iOS versus other digital game app  
20 transaction platforms?

21 **A.** Yes, I did.

22 **Q.** Could we have slide 25.

23 And is that what you show in this slide?

24 **A.** Yes. Now, this is something you don't normally get to  
25 observe so I thought this and some of the other subsequent



1 analysis is -- is very interesting. The -- so the first  
2 thing -- what this is is this is of all consumers who use  
3 *Fortnite* on iOS, where did they buy, if at all. Now, first  
4 thing not especially surprising, 76 percent of consumers don't  
5 buy anything. They play. They do their thing. They're fine.  
6 They don't buy anything.

7 Of the remaining consumers that do purchase, about --  
8 well, about 16 percent -- well, less than 16 percent play  
9 *Fortnite* on iOS but never buy anything there. Apple provides  
10 them with the ability to download -- to provide and have  
11 consumers download *Fortnite* for iOS. Consumers play on it.  
12 They don't have any transactions on iOS. Apple earns no  
13 commissions on any of those transactions because they occur on  
14 other platforms.

15 There is a group of consumers, 5.6 percent -- that's kind  
16 of the green pie -- that only buy on iOS, nowhere else. And  
17 then a smaller group that sort of do both. 2.8 percent, they  
18 purchase on iOS and they also purchase on non-iOS platforms.

19 So, again, many people don't pay anything and a lot of  
20 people purchase on other platforms, even though they  
21 downloaded and played the game on iOS.

22 **Q.** Professor Hitt, this data, this -- that's reflected in  
23 this slide, is this a sample of the *Fortnite* data or is this  
24 all of the *Fortnite* data?

25 **A.** So it's restricted in time periods so we could capture

1 where we are sort of today. But this is all transactions, so  
2 there is no sampling here. Among users who -- accessing  
3 *Fortnite* in January of -- from January to July, right before  
4 the hotfix event, this is where they were. This is everyone.  
5 So -- for one reason, that's why I don't have to, for example,  
6 compute standard errors or any other statistics on it. It is  
7 what it is. These are the numbers.

8 **Q.** Can we have slide 26.

9 Did you look at the proportion of time played and the  
10 amount of spending on other platforms by users who accessed  
11 *Fortnite* on iOS?

12 **A.** Yes. That's -- that's depicted here.

13 **Q.** And can you walk us through this -- again, a slide that is  
14 full of numbers?

15 **A.** Okay. This is full of numbers. So this is based on the  
16 entire 2.8 billion transaction dataset which has monthly  
17 expenditure by consumer. And what I did was I looked to see  
18 what fraction of time played and what fraction of revenue for  
19 iOS users is on iOS versus other platforms. If you recall  
20 from the previous slide, that a lot of the iOS spending  
21 actually -- a lot of the spending for consumers who are on iOS  
22 is not made on iOS. They play the game on iOS, but they don't  
23 spend their money there. Some do. And so I did a calculation  
24 as to what that is.

25 So this is restricted to consumers who have accessed the

1 game on iOS. And what you find is that iOS is about 10  
2 percent of the gameplay for these consumers and about 13.2  
3 percent of the revenue for these consumers.

4 So there's, I think, two interesting things you can take  
5 away from that, is that the vast majority of spending of these  
6 consumers and the vast majority of play is on other platforms.  
7 Epic is able to access, if you want to use that language,  
8 these consumers on other platforms.

9 And the second thing is that the -- and I alluded to this  
10 in the quality discussion, the iOS is slightly better at  
11 generating revenue per unit of time played. The percentage of  
12 revenue is somewhat higher than the percentage of time played  
13 than the typical platform, and, in fact, you can do a  
14 calculation of revenue per minute. You find that iOS tends to  
15 be at the top. But, again, most of the activity, both  
16 gameplay and time, is on non-iOS platforms, even for iOS  
17 users.

18 **Q.** Professor Hitt, for your analysis, was it important to be  
19 able to distinguish consumer paying and consumer playing, so  
20 to speak?

21 **A.** Yes. There is -- there is an important distinction  
22 between those two things. I can play the game on a variety of  
23 platforms, different time, different place, or even at the  
24 same time. I believe one of the gentleman from Epic says he  
25 likes playing on his iPad even though he has a console

1 available. So you can decide where you want to pay -- where  
2 you want to play, and that might have some constraints on it,  
3 but you can also make a separate decision as to where you are  
4 going to pay.

5 Now, this indicates that a lot of consumers pay on other  
6 platforms. We also, I think, had a discussion before -- I  
7 think Your Honor was involved -- about, you know, you can buy  
8 V-Bucks on a web browser and so that disconnects -- so even if  
9 you can't play *Fortnite* in a web browser, you can still buy  
10 V-Bucks and transact for *Fortnite* on a web browser, and that  
11 distinction is very important when you start talking about  
12 where people perform game transactions. You can still  
13 download and have free apps on iOS, use all the services of  
14 the Apple ecosystem, and transact elsewhere, and that's an  
15 important part of thinking about the way this market works.

16 **Q.** Could we have slide 27, please.

17 We talked earlier about natural experiments that show  
18 consumer substitute. How did you reach that conclusion?

19 **A.** Okay. So there's -- there were, you know -- one of the  
20 challenges in this environment is you have an environment of  
21 steady prices, and for game transactions, the prices have  
22 generally been steady. I think Dr. Evans agrees with me on  
23 that point. And so if you're trying to measure substitution,  
24 you normally rely on a price change, but there isn't one, so  
25 we are in a world where we look at what I'm calling natural

1 experiments, things that happen that give you an indication  
2 can consumers move across these platforms when given a reason  
3 to do so.

4 I was able to identify five -- five situations that could  
5 be analyzed that can give insight into that. Three of these  
6 relate specifically to games so we can analyze, I think like  
7 Dr. Evans did, what happened after the hotfix and iOS *Fortnite*  
8 became essentially unavailable on iOS. The introduction of  
9 the Nintendo Switch. Consumers had a new platform. What did  
10 they do? There is a similar analysis that I do related to the  
11 download of console or PC gaming applications, so I look at  
12 consumers who did something to see what they did later. That  
13 "did something" is download one of these companion apps. We  
14 will talk about that probably a bit more later. And then  
15 there is two examples where certain -- where the developer or  
16 the provider, depending on how you consider these, decided to  
17 stop offering transactions through iOS. You can examine what  
18 happened to them subsequently. Were they able to still serve  
19 their customers as they had before? And that applies to  
20 Spotify and Netflix. And it relates to the withdrawal of the  
21 ability to transact in these subscriptions.

22 Q. Okay. We'll walk through each of these in more detail,  
23 but before we do, just to set the table, Professor Hitt, do  
24 you teach econometrics and empirical methods at Wharton to  
25 Ph.D. students?

1     **A.** Yes. A big part of my Ph.D. class is devoted to empirical  
2     methods for the study of the information economy.

3     **Q.** What is econometrics?

4     **A.** Econometrics is the use of statistics for evaluating  
5     economic outcomes or predictions.

6     **Q.** And in these natural experiments, did you use the best  
7     practices and methods that you would use in your academic work  
8     including with your Ph.D. students?

9     **A.** Absolutely. And we actually have a unique advantage  
10    here -- is that we can work with entire populations rather  
11    than samples which gives you a huge advantage. It can  
12    simplify things dramatically when you know everything that has  
13    happened.

14    **Q.** And you worked with all the available data for these  
15    analysis as opposed to a sample; is that right?

16    **A.** That's correct. For -- for the Apple data, we had  
17    available to the full transaction dataset all app  
18    transactions. For the Epic data, I used the full dataset for  
19    there as well, 2.8 billion monthly observations.

20    **Q.** And that's different from what Dr. Evans did; correct?

21    **A.** So a lot of the analysis that was done by Dr. Evans was  
22    using a sample, less than one-percent sample of *Fortnite*  
23    transactional data.

24    **Q.** Okay. Could we have slide 28, please.

25         So let's talk about the *Fortnite* substitution analysis

1 that you conducted. Can you just describe for the Court what  
2 you did?

3 **A.** Sure. So after -- so *Fortnite* was available on iOS. It  
4 was available for the iOS for some time. Then the hotfix  
5 event occurred in August, and it made -- essentially made  
6 *Fortnite* unavailable on the iOS platform.

7 And so what I did was an analysis that attempts to  
8 evaluate what happened in terms of that spending that  
9 consumers were doing on *Fortnite* both before and after.  
10 Before they were buying wherever they wanted to on various  
11 platforms. Afterwards, the ability to transact on iOS -- it  
12 didn't disappear entirely, but it was severely reduced. And  
13 so you can then look to see where, if anyplace, that spending  
14 moved, and then you can do some calculations.

15 And the -- again, the critical part of this is trying to  
16 figure out what would have happened had this not occurred. So  
17 there has to be some substantial corrections for the  
18 differences across consumers and differences across time, but  
19 ultimately the goal was to try to figure out how much the  
20 expected spending was retained by Epic following the hotfix  
21 event when people could no longer transact in a normal way  
22 through iOS.

23 **Q.** And what did you find?

24 **A.** So what you find is -- is you -- of the user spending that  
25 was occurring on iOS, depending on which month you look at --

1 and it varies by month as you go out. So it happened in  
2 August -- you can do September, October, November, and  
3 December. We have data that runs through the end of the year.  
4 Again, it varies by month, but month to month, you get between  
5 22 and 51 percent of the spending relative to what it would be  
6 was retained on other platforms or actually shifted to other  
7 platforms.

8 Now, what's interesting about that is we've been talking  
9 about the fact that a lot of iOS users are multi-platform. It  
10 turns out that if you focus solely on users that -- that  
11 played on iOS, even 22 to 38 percent of their spending shifted  
12 to another platform. So these are people who had both to  
13 adopt another platform or at least start playing on another  
14 platform, and they shifted their spending as well.

15 **Q.** Does this slide show that Epic lost more than half of the  
16 spending for *Fortnite* from users who use iOS?

17 **A.** Well, that's -- that's another interesting thing. So not  
18 all of the iOS spending moved over, but as we saw a few slides  
19 back, a lot of the spending was already on other platforms for  
20 iOS users, so an iOS user, say, who was playing on their  
21 PlayStation and was spending on their PlayStation essentially  
22 continued to do so. There is some fluctuation, but that  
23 continued to happen.

24 And then some of the spending that was happening on iOS  
25 moved off iOS onto other platforms. The net effect was -- is



1 that Epic retained between 81 and 88 percent of the expected  
2 *Fortnite* spending following the hotfix event.

3 Q. What do you conclude from that number?

4 A. That consumers are willing to and able to move across  
5 platforms when they have reasons to do so.

6 Q. Did Dr. Evans also find evidence of substitution in his  
7 *Fortnite* analysis?

8 A. Yes. And I think there's a couple of useful points there.  
9 One is he describes this specifically as substitution. I  
10 think he used that word. Second is he does -- does this with  
11 a sample rather than using the full data, and he does a number  
12 of different steps and regressions and assembles them  
13 together. But once you look at -- and gets a different  
14 number, at least a bit different number. I think his numbers  
15 are like 30 and 16.3 depending on whether he makes one of the  
16 corrections he suggests.

17 But if you look at the confidence intervals of his  
18 estimates, they are not that different from my estimates. So  
19 he uses a different methodology. I think there is issues with  
20 it, but ultimately he reaches the same conclusion, which is  
21 that consumers are willing to substitute when given reason to  
22 do so.

23 Q. Let's turn to your second analysis which I understand  
24 relates to when *Fortnite* launched on the Nintendo Switch.

25 A. That's correct.

1 Q. Can we have slide 29, please.

2 What month did *Fortnite* launch on the Nintendo Switch?

3 A. So *Fortnite* launched on the Switch first in June 2018.

4 Q. What are you comparing on this slide? I see a green line  
5 and a blue line. Can you just walk us through what those  
6 lines reflect?

7 A. Okay. So let me quickly orient you to the chart. So the  
8 horizontal axis is the passage of time. I started in March  
9 2018 and went through March 2019. Where you start doesn't  
10 matter too much. And what I looked at was two groups of  
11 consumers. I looked at consumers who access *Fortnite* on  
12 iOS --

13 THE COURT: It doesn't matter so much because you're  
14 using a year?

15 THE WITNESS: So you can -- so the -- you can do  
16 sensitivity on it and try different starting points, and you  
17 basically get to the same place.

18 THE COURT: But I guess -- my question is, is the  
19 full year an appropriate interval?

20 THE WITNESS: So where you cut off isn't tremendously  
21 critical. I think it's nice to see how it evolves, but the  
22 way -- one of the issues with this kind of analysis where you  
23 have an event and you're watching what happens afterwards is  
24 that when the event happens, you're pretty sure that it's --  
25 whatever you're watching is related to the event. As time

1 evolves, more things happen that kind of make it harder to  
2 see. So I think it's useful to see what happens afterwards,  
3 but kind of the closer to the event is probably more important  
4 than later after the event.

5 **THE COURT:** Okay. Thank you.

6 **THE WITNESS:** So we have two groups of consumers.  
7 One group of consumers accessed *Fortnite* on an iOS device in  
8 June and did not access it on a Switch.

9 **BY MS. RICHMAN:**

10 **Q.** That's green?

11 **A.** Yes. That's correct. That's the iOS group.

12 **Q.** Okay.

13 **A.** And then another group of consumers, which is the blue  
14 line, accessed *Fortnite* on iOS in June as well as on a Switch.  
15 And so what we're comparing is that for the consumers who  
16 adopted *Fortnite* for the Switch, did they change their  
17 behavior relative to what had been done in the past. Before  
18 we actually discussed a little bit about this.

19 There is a couple of things about this analysis that is  
20 important to understand. One thing is, is that different  
21 consumers are different. Different groups of consumers might  
22 spend more or less or so, and so what we're trying to compare  
23 here is what somebody did relative to what they would have  
24 done, and so it's important to account for differences across  
25 consumers in doing so.

1 And to do so, I indexed consumers so that they start in  
2 the same place in March of 2018 to account for these  
3 differences so we can watch them evolve relative to the way  
4 they were.

5 The second -- and it's really important, especially for  
6 *Fortnite*, is that the spending on *Fortnite* -- and you can kind  
7 of see it in this graph -- varies tremendously month to month.  
8 And in particular, it's heavily driven by new releases and new  
9 seasons. So there was a new season in July, for example.  
10 There is another one, as you might guess from the graph, in  
11 December. And that changes the way consumers behave, so one  
12 of the other things that is important to do is to do your  
13 analysis so that you account for the fact that behavior varies  
14 over time. So differences across consumers, variation over  
15 time have to be accounted for to get a clean result.

16 So the way I did it was compared this group that had  
17 *Fortnite* on iOS, compared it to the group that had *Fortnite* on  
18 iOS and Switch, and looked at what happened when the Switch  
19 becomes available. And what you see is they're pretty close  
20 beforehand, then they begin to diverge and they stay apart.  
21 And what that indicates is that these consumers who adopted  
22 the Switch are shifting some of their activity that they would  
23 otherwise do from iOS to somewhere else, presumably to Switch,  
24 and that's an indication of substitution. Consumers have a  
25 reason to move and they do.

1 Q. Professor Hitt, yesterday there was discussion with  
2 Professor Schmalensee as to whether this analysis showed  
3 relative or absolute substitution. Did you listen to that  
4 testimony?

5 A. Yes, I did.

6 Q. And in your opinion as the one who conducted the study,  
7 does this graph show absolute substitution?

8 A. So in the sense it was being used, yes, this is absolute  
9 substitution. There was, you know, some confusion. I  
10 presented some data where I showed the fraction of consumers  
11 accessing on different platforms, and there was some  
12 discussion by Professor Schmalensee in his deposition  
13 regarding whether you could use those percentages or not to  
14 make these inferences and that really you shouldn't use  
15 percentages of total spending, you should use total spending.  
16 I think he testified that he was unaware that we had done  
17 another analysis here.

18 I'd also mention that to the extent that there is any  
19 difference between that analysis on total spending versus the  
20 percentages, it is entirely driven by these season  
21 introduction events and the not-surprising finding that people  
22 spend more on *Fortnite* when they have a new season release and  
23 they do it on all platforms. So to the extent there might  
24 have been any rise that would make this inconsistent with  
25 other analyses, it's entirely driven by these season events.

1 Q. Thank you, Professor Hitt.

2 Let's turn to slide 30 and your next analysis.

3 I understand you did an analysis on people who download  
4 console and PC gaming companion apps. Before we get into the  
5 details, can you just explain what is a console or PC gaming  
6 app?

7 A. So there are apps that exist on the App Store that are  
8 intended to be used alongside an Xbox or a PlayStation or when  
9 you Steam, and the types of functionality you have are things  
10 like you can use the app to instruct your Xbox to download a  
11 game or you can, you know, interact with your Xbox in various  
12 other ways.

13 The Xbox app is kind of neat because if you have a good  
14 enough network connection, you can actually play Xbox games on  
15 your phone through the Xbox app. Your console has to be  
16 running, but that's something you can do.

17 In any event, there is an Xbox app, there is a PlayStation  
18 app, there is a couple of Nintendo apps, and there is a Steam  
19 app. And the nice thing is because we have detailed  
20 transaction data from Apple, we can observe when consumers  
21 downloaded these apps, and that provides a proxy or an  
22 indication that consumers probably either have a console,  
23 acquired a console, or are intending to do something with a  
24 console, which would have prompted them to download one of  
25 these apps.

1 Q. And what are you comparing in this slide, slide 30?

2 A. So what I look at is the two bars. One group of consumers  
3 downloaded one of these console apps in 2018; another group of  
4 these consumers never downloaded one of these console apps  
5 ever, at least over the span of the data we have. And what  
6 I'm comparing is their growth rate in spending on iOS between  
7 2017 and 2019.

8 Again, it's important to do these in growth rate because  
9 that accounts for the fact that different consumers have  
10 different spending levels. And what you find is that the  
11 consumers who downloaded one of these console apps, the  
12 right-hand, you know, dark blue bar, they are spending on iOS  
13 group by 19 percent as a group. The corresponding group that  
14 did not have one of these apps spent -- grew by, in the same  
15 period, 24 percent, but a five percent absolute difference  
16 which is about a 20 percent difference in growth rate. So  
17 when you have an additional option, your spending on iOS apps  
18 slows. That indicates that consumers were substituting from  
19 iOS to console.

20 The one other additional interesting thing about this is  
21 because not all apps on iOS are available on console, this  
22 gives you some indication that some of this may be related to  
23 switching -- substituting across games, not just within the  
24 same game across platforms.

25 Q. Professor Hitt -- strike that.

1 Can we -- we don't need a slide right now. Thank you.

2 Let's go to your final two natural experiments. I think  
3 you previously mentioned that those related to Spotify and  
4 Netflix subscriptions; is that right?

5 **A.** That's correct.

6 **Q.** And can you just describe the nature of that analysis?

7 **A.** These are pretty straightforward. We have different data  
8 from Spotify and Netflix so the analysis is a little  
9 different. It's in my written report, but essentially what  
10 happened is that Spotify and Netflix decided to not offer new  
11 subscriptions through the iOS app, so it's possible to see  
12 whether that had any impact on their revenue or their ability  
13 to obtain premium users on iOS and so forth, and what you see  
14 is that after they switched subscriptions, they were able to  
15 still continue to serve these customers, even consumers who  
16 are using the iOS app. No change in revenue and no indication  
17 of any sort of change in the use of the iOS app when we had  
18 that data available.

19 **Q.** Spotify and Netflix are not gaming apps; is that correct?

20 **A.** No. No, they're not. I think it's informative generally  
21 as to whether consumers can move across platforms, but they're  
22 not games.

23 **Q.** Let's switch subjects and talk about a related topic, ease  
24 of substitution.

25 We heard this week that Dr. Evans and Professor Athey are



1 of the view that consumers face high barriers to substitution  
2 across transaction platforms. Is that consistent with your  
3 analysis?

4 **A.** I think generally no.

5 **Q.** And is -- have you considered that on both the developer  
6 and the consumer side of the transaction platform?

7 **A.** Yes. And what you see is developers can serve customers  
8 on multiple platforms and consumers have the ability to,  
9 already do, move across these platforms and will move across  
10 them if given reason to do so.

11 A lot of the discussion that we saw from Dr. Evans and  
12 Professor Athey is indicating the difficulties of doing things  
13 that consumers are already doing all by themselves without any  
14 incentives to do so through price.

15 **Q.** We heard a lot about frictions this week, and did you hear  
16 the testimony that Mr. Sweeney does not consider out-of-app  
17 transactions to be substitutes for in-app transactions?

18 **A.** Yes, I did.

19 **Q.** And that related to frictions; is that correct?

20 **A.** I think they -- they've been described by a variety of  
21 people as being frictions.

22 **Q.** And was that testimony consistent with that you've heard  
23 from other app developers in this case?

24 **A.** Well, you know, other -- other app developers do indicate  
25 that they're able to participate on multiple transaction

1 platforms. The gentlemen, Yoga Buddhi, mentioned that he was  
2 able to -- he was able to have consumers, for example,  
3 transact through a web browser to buy their subscriptions, and  
4 there has been others. There is a lot of examples in the data  
5 I've seen where, for example, consumers can buy V-Bucks  
6 through a web browser.

7 **THE COURT:** Is "friction" a term of art in your  
8 industry?

9 **THE WITNESS:** So yes and no. It's a casual term that  
10 is usually meant to relate to some kind of cost to do a  
11 particular activity, so -- and there's this concept called  
12 "frictional costs" that is sometimes used in the -- in the  
13 switching cost literature.

14 So it's a term of art in the sense that it describes  
15 something broadly, but then it immediately has to be  
16 operationalized, what actually are you talking about here, how  
17 difficult really is it to do X versus Y.

18 **THE COURT:** But is that then a qualitative analysis  
19 as opposed to a quantitative analysis?

20 **THE WITNESS:** So it depends on what -- which  
21 literature you're looking in. So people have, for example,  
22 done quantitative analysis on that. You need pretty good --  
23 it has to -- the stars kind of need to align on the empirical  
24 data to do that, but there have been people who have done that  
25 historically. When you're talking in that literature, it's

1 often done qualitatively, but you can quantify it if you want  
2 or at least you can get a metric that you can then make a  
3 judgment to say, "Hey, this looks like it's a lot" or "that  
4 doesn't seem like very much."

5 **THE COURT:** So a qualitative analysis isn't  
6 inappropriate?

7 **THE WITNESS:** No. I don't believe so.

8 **THE COURT:** Proceed.

9 **BY MS. RICHMAN:**

10 **Q.** Professor Hitt, did you evaluate Epic's claim that there  
11 are frictions to making purchases outside the app for content  
12 to use within the app?

13 **A.** Yes. You can look at what those -- those frictions might  
14 be. One of the -- the things that indicate those frictions  
15 might be low is consumers actually do this, and you can think  
16 of at least a couple scenarios. For example, if you are on a  
17 console, there is very little, if any, friction there. And  
18 then web browsers are, for example, widely available. You are  
19 able to log in, download, and transact on a web browser for if  
20 you have a common currency and if the developer so chooses,  
21 they can make that functionality available, and that's very  
22 easy to do.

23 And it's important to put this in context. You know,  
24 we're talking about frictions in sort of a digital commerce  
25 record, and maybe we have just gotten habituated that things

1 are easy to do, but if you think about the friction that is  
2 leading to anticompetitive conduct is leaving an app and  
3 spending a minute or two on a web browser, that -- you think  
4 about what that looks like in the real world, you're talking  
5 about, for example, how many convenience store -- there is no  
6 way I'd go to another convenience store because it's just --  
7 I'd have to walk across the street to do so. That's, you  
8 know -- the types of frictions we're talking about here that  
9 are supposedly insurmountable seem very small compared to the  
10 ones you would typically see in the real world. So it's hard  
11 to imagine that that is a substantial enough friction, but,  
12 again, you can judge, you know, from what you observe  
13 qualitatively whether you think that's the case. And  
14 certainly consumers are able to overcome this because they do  
15 perform transactions on a wide variety of these platforms.

16 **Q.** So, Professor Hitt, as an economist that tests for  
17 evaluating frictions, it's not whether you could do something  
18 with a baby on your shoulder; is that correct?

19 **A.** I won't even go there.

20 **Q.** You talked earlier about the role that developers can play  
21 in easing these frictions.

22 Can we have slide 31, please.

23 What does this slide tell you about the developers' role  
24 in easing frictions between switching -- substitution between  
25 digital and transaction platforms, game transaction platforms?

1     **A.** Right. So as I mentioned, a lot of these frictions are  
2     under developer control. They can choose to offer services  
3     that make it easy to move across these platforms if they so  
4     choose. Two of them -- I think this has come up before, but  
5     just to quantify -- are do they offer the -- I think  
6     Your Honor actually mentioned these explicitly. Can I sign on  
7     to my same account? That is offered -- if you look at all  
8     apps or even by game apps, that is typically offered. And  
9     then the other one is can I move my content across apps? And  
10    I did an analysis for the top 25 apps by downloads and revenue  
11    for all apps and for game apps just to see how prevalent it is  
12    for at least the common apps. This is very labor intensive so  
13    you could probably extend it to 50. You could probably extend  
14    it more, but I focused on the top 25. And what you find is  
15    that most apps, most of the large apps that are revenue  
16    generating offer some form of single sign-on. Sign on once.  
17    My account is portable across the -- across devices and many  
18    of -- most of them also, although not all, offer the ability  
19    to transfer some or all content across these apps.

20       So I think you asked earlier about the extent to which you  
21    can move your stuff off or whether you have to basically  
22    liquidate your account before you move. At least most of the  
23    top 25 revenue-generating apps have some form that allows you  
24    to move at least some of that, but not necessarily all and not  
25    necessarily all of them.

1           **THE COURT:** And what is the overlap between the top  
2       25 game versus top 25 overall?

3           **THE WITNESS:** I'd have to go back and look. When  
4       you're talking revenue, I believe that overlap is pretty good.  
5       When -- and so revenue and downloads, that's pretty different  
6       because you're talking about, you know, a lot of apps that  
7       monetize, for example, with advertising, and so that will make  
8       that group very different.

9           There is a fair amount on the revenue-generating apps  
10       between games and all apps just because game apps tend to be  
11       high-revenue generators. I could probably do the calculation,  
12       but it's not on the top of my head, and it's, you know,  
13       calculable from the back up.

14           **THE COURT:** Proceed.

15       **BY MS. RICHMAN:**

16       **Q.** Professor Hitt, let's talk briefly about an exceedingly  
17       popular app that no one in this courtroom has ever used,  
18       Tinder. Is Tinder one of the top 25 apps that you analyzed?

19       **A.** Yes. It's not a game, but it is a high-revenue-generating  
20       app, yes.

21       **Q.** Does Tinder have a single sign-on?

22       **A.** Yes, it does.

23       **Q.** And does Tinder allow users to make subscription and  
24       non-subscription purchases outside of the app through its  
25       website?

1     **A.** It allows that as well.

2     **Q.** And can you use Tinder in an iOS web browser?

3     **A.** Yes. I think the swiping is a little different in the  
4 browser, but I think you basically poke a button, but, yes,  
5 the functionality of Tinder is available through a web  
6 browser.

7     **Q.** From the standpoint as an economist, do you think that  
8 these different sorts of transactions on Tinder involve  
9 significant friction?

10    **A.** My assessment would be that these frictions are very low  
11 as you can move across these platforms easily depending on  
12 what you choose to do, and certainly the developer made it  
13 relatively easy to -- to do transactions in a variety of  
14 places.

15    **Q.** Okay. Just a couple more questions, Professor Hitt.

16           Professor Hitt, you understand that there will be rebuttal  
17 opinions offered by Dr. Cragg in this case; is that right?

18    **A.** Yes, I do.

19    **Q.** And does Dr. Cragg critique your analysis in his written  
20 direct testimony?

21    **A.** Yes.

22    **Q.** And when was the most recent production for the backup of  
23 Dr. Cragg's analysis produced?

24    **A.** About a week ago.

25    **Q.** And have you or your team had the opportunity to review

1 that backup data?

2 **A.** Not completely. We certainly looked at it, but we haven't  
3 done a comprehensive analysis of what he did.

4 **Q.** Have you had the opportunity to respond to Dr. Cragg's  
5 critiques?

6 **A.** No. The timing was such that I wasn't able to respond  
7 directly.

8 **MS. RICHMAN:** Pass the witness, Your Honor.

9 **THE COURT:** How much time would you need?

10 **THE WITNESS:** Sorry?

11 **THE COURT:** How much time would you need?

12 **THE WITNESS:** So more than a week. Several -- a  
13 couple of weeks is typically the case. In terms of doing  
14 the -- you know, in general, doing reanalysis doesn't take  
15 very much time, but the challenges, of course, in litigation  
16 settings where you have to be extremely careful and get  
17 absolutely everything right, that adds a little more time to  
18 the point where we would have something we would be willing to  
19 present.

20 **THE COURT:** Okay. While Mr. Even is getting ready  
21 for cross-examination, do you want to go on the record about  
22 whether you use Tinder? Sorry. You don't have to answer  
23 that.

24 **THE WITNESS:** It's surprising, the -- whenever I talk  
25 about Tinder in my class, it's every one of my students, Ph.D.



1 students in particular, has access to Tinder. You can have a  
2 rich discussion. I just can't participate as effectively.

3 **THE COURT:** All right. Cross.

4 **MR. EVEN:** May we approach and provide some binders?

5 **THE COURT:** You may.

6 When was the Cragg rebuttal report produced?

7 **MR. EVEN:** I'm sorry, Your Honor.

8 **THE COURT:** When was the Cragg report produced?

9 **MR. EVEN:** At the same time as Professor Hitt's,  
10 Your Honor. It was an exchange in --

11 **THE COURT:** No. I'm talking about the rebuttal.

12 **MR. EVEN:** That was a rebuttal, the exchange rebuttal  
13 report.

14 **MS. RICHMAN:** Your Honor, this is the analysis that  
15 appeared in Dr. Cragg's written direct testimony, not his  
16 rebuttal report.

17 **MR. EVEN:** Your Honor, this was the analysis -- this  
18 was backup to some of the analysis that used Professor Hitt's  
19 own data that the parties have briefed as part of the  
20 objections and Your Honor has ruled upon, and I can ask  
21 another couple questions to Professor Hitt about it.

22 **THE COURT:** Go ahead.

23 **CROSS-EXAMINATION**

24 **BY MR. EVEN:**

25 **Q.** Professor Hitt, the day that Apple asked for the backup

1 for Dr. Cragg, Epic asked for the backup for new charts in  
2 your direct testimony. Are you aware of that?

3 **A.** I believe so, yes.

4 **Q.** And when was that data produced?

5 **A.** I don't recall. I was aware of the request, but I don't  
6 know when it actually was delivered.

7 **Q.** Could it be that it hasn't been produced yet?

8 **A.** I don't know. I don't believe there are new analyses. I  
9 think I made a pie chart out of data in my report, and there  
10 was a couple of drop lines and charts, but, again, I don't  
11 know. My research team was working to do that.

12 **Q.** Okay. So I want to go quickly over some things that you  
13 mentioned in your direct as they are fresh in our mind and in  
14 the Court's mind.

15 One was about -- you talked some about switching between  
16 Android and iOS. Do you recall that?

17 **A.** Yes. There was some discussion of it. I don't think I  
18 said it as explicitly as that, but, yes.

19 **Q.** And I believe you mentioned the number 78 million new  
20 phones sold every year; is that correct?

21 **A.** That's correct.

22 **Q.** And that's compared to the about 300 million or a little  
23 more that there are in the U.S.; correct?

24 **A.** That sounds right.

25 **Q.** And you said that there is some studies that go between

1 low single digits to 26 percent of switching; correct?

2 **A.** Yes. That's correct.

3 **Q.** And so if we take -- let's take 10 percent to make our  
4 life easy. So 10 percent of 78 million would mean that there  
5 are about somewhere between 7 and 8 million switching every  
6 year under that assumption; correct?

7 **A.** Yeah. I think that sounds right.

8 **Q.** And that's about 7 or 8 million out of 300 million phones;  
9 correct?

10 **A.** I think your math is right.

11 **Q.** Okay. And what is that as a percentage?

12 **A.** That's something like four percent of the installed base,  
13 something like that.

14 **Q.** Okay.

15 **A.** Maybe three to four percent of the installed base.

16 **Q.** You talked about some streaming services have great  
17 innovation; correct?

18 **A.** Yes.

19 **Q.** And you agree that those streaming services are not -- not  
20 able to be native apps on iOS; correct?

21 **A.** That's correct.

22 **Q.** And you agree with me that, for instance, if Netflix were  
23 not allowed to be a native app on iOS, that would harm  
24 Netflix; correct?

25 **A.** I don't know for sure, but that is probably the case, yes.

1 Q. And it would harm innovation and competition; correct?

2 A. I'm not sure. I haven't done an analysis that would go  
3 that far.

4 Q. You're not sure -- sorry?

5 A. I don't know. That's not something I've done.

6 Q. You don't know if booting Netflix off the App Store would  
7 be bad for innovation and competition?

8 A. So it's -- I haven't done the analysis. I would think  
9 that it would be harder to access Netflix. It would depend on  
10 what their response was.

11 Q. But based on Apple's position in this case, Apple could  
12 decree tomorrow that Netflix is off the App Store; correct?

13 A. I believe that's within their policies. This is not  
14 something that's happened.

15 Q. I want to go back to slide 17 that you had put up. Do you  
16 recall that slide?

17 A. If we could pull it up, that would be helpful.

18 Q. It's on the screen.

19 Do you recall that slide?

20 A. Yes, I do.

21 Q. And in that slide, you mentioned that something wonderful  
22 happened to Epic in March of 2018 or a little earlier, and  
23 *Fortnite* came out and came out on iOS; correct?

24 A. That's correct.

25 Q. And that was in the -- in Epic's sphere, that was a big

1 innovative step for Epic; correct?

2 **A.** Yes.

3 **Q.** And I think you mentioned that that caused Epic to be able  
4 to charge much more than it had before for in-app  
5 transactions; correct?

6 **A.** Yes.

7 **Q.** And you said that that's a good thing, that means that  
8 Epic was providing much more value to its customers than it  
9 had before; correct?

10 **A.** Yes. Rising prices is consistent with greater consumer  
11 value if people are willing to pay.

12 **Q.** And -- sorry. Didn't mean to cut you off. Thank you for  
13 that.

14 And if we see -- look at the median, I think you mentioned  
15 that essentially Epic was able to sell something that  
16 consumers valued at about five dollars up to March of 2018 and  
17 about ten dollars after that; correct?

18 **A.** That's correct.

19 **Q.** And that is a hundred percent increase, even I understand  
20 that; right?

21 **A.** Sure.

22 **Q.** Okay. Now, what happened to the commission that Apple was  
23 charging was that it went up from one and a half dollars to  
24 three dollars on that day; correct?

25 **A.** That's correct as well. Commission price has been

1 constant. Price of the app chosen by Epic has increased.  
2 That followed.

3 **Q.** So Apple started making a lot more money on each  
4 transaction on -- on an Epic game; correct?

5 **A.** That's correct.

6 **Q.** The same hundred percent increase; correct?

7 **A.** They are proportional under the commission rate scheme.

8 **Q.** Now, the transactions that occurred in February 2018  
9 weren't any different from the transaction service provided by  
10 Apple in April of 2018; correct?

11 **A.** So the transaction itself is very similar. The capability  
12 to offer games like *Fortnite* accumulated over many, many, many  
13 years before.

14 **Q.** I understand, sir.

15 In March of 2018, Apple did not introduce any new  
16 innovation into the sphere of App Store transactions that  
17 completely changed the value that it delivered to Epic;  
18 correct?

19 **A.** That's correct.

20 **Q.** Thank you.

21 Now, this kind of pricing based on a percentage of the  
22 transaction is somewhat common in specific licensing like IP  
23 licensing; correct?

24 **A.** It's a common economic mechanism that allows you to share  
25 revenue without having to have a huge amount of information

1 about what your counterparties are doing.

2 Q. And it is known as ad valorem commission; correct?

3 THE COURT REPORTER: I'm sorry?

4 THE COURT: He said "ad valorem."

5 THE WITNESS: That's not a phrase I have used. I  
6 just think of it as a percentage commission.

7 BY MR. EVEN:

8 Q. Okay. Now, in the context of a patent license, for  
9 instance, a patent runs out after 20 years; correct?

10 A. Patents do have a duration.

11 Q. But Epic -- but Apple's position is that it's entitled to  
12 this 30 percent forever?

13 A. For -- Apple's commission scheme is if you sell something  
14 on the App Store, they get a 30 percent. I don't think --  
15 there is not a temporal element in that sense.

16 Q. It doesn't have the same temporal element of the IP  
17 license; correct?

18 A. It's not a comparison I've drawn, but if you transact in  
19 the App Store, you earn revenue, the commission is triggered  
20 by that event.

21 Q. I want to go back for a second to one of your other slides  
22 where you suggested that Epic retained 81 to 88 percent of its  
23 iOS revenue following the termination of Epic from the App  
24 Store. Do you recall that?

25 A. Yes.

1 Q. And I believe that was slide 28. That was your opinion?

2 A. Yeah. That's a calculation.

3 Q. Okay. So I want to talk a little bit about this  
4 calculation, if we may.

5 A. Sure.

6 Q. Can we bring up our Exhibit 13 demonstrative. Our Exhibit  
7 13 demonstrative. The pie chart. The pie chart.

8 Okay. Never mind.

9 THE COURT: If you don't have it, we can turn on the  
10 ELMO.

11 MR. EVEN: I don't have it here.

12 Q. So let's just use your numbers -- and that's okay. If we  
13 can turn to Hitt 25, slide number 25. If you can open that  
14 slide up, sir. That's from these binders. So unless there is  
15 some difference between what I have and what they have, I  
16 don't know.

17 THE COURT: Mr. Even, you have a physical copy?

18 MR. EVEN: I do have a physical copy and the witness  
19 has a physical copy before him, I believe, so we can talk  
20 about it like that.

21 THE COURT: So where -- you gave me two binders. Do  
22 I have a physical copy?

23 MR. EVEN: Your Honor, if I may step for a second to  
24 Mr. Rudd?

25 THE COURT: You may. Again, we also have the



1 capability of turning on the ELMO, the overhead, and you can  
2 put it right on there.

3 **BY MR. EVEN:**

4 **Q.** Sir, in slide 25 --

5 **THE COURT:** Can we turn on the ELMO?

6 **MS. RICHMAN:** Mr. Even, I don't believe that is slide  
7 25 of Professor Hitt's deck.

8 **MR. EVEN:** It said slide 25 in my binder.

9 **MS. RICHMAN:** That was not used today.

10 **MR. EVEN:** Okay. But it's in my binder.

11 **MS. RICHMAN:** It's not in my binder.

12 **MR. EVEN:** Let me just put it up.

13 **MS. RICHMAN:** No. That is slide 25. I was talking  
14 about the one you had up before. Sorry.

15 **MR. EVEN:** That is slide 25 from today?

16 **MS. RICHMAN:** Yes, it is.

17 **MR. EVEN:** Thank you.

18 **Q.** So, Professor Hitt, I just want to make sure we understand  
19 exactly what you explain when you explain the 85 percent. So  
20 what we see here are purchasing behaviors of iOS *Fortnite*  
21 users; correct?

22 **A.** That's correct.

23 **Q.** And what we have here is that you said 75.9 percent make  
24 no purchases at all; correct?

25 **A.** That's correct.

1 Q. And 15.8 percent buy only on other platforms; correct?

2 A. That's correct.

3 Q. And so that is essentially somebody who, once in their  
4 life or maybe more, opened *Fortnite* on an iOS device but  
5 generally they only transact on other platforms such as the  
6 Sony PlayStation?

7 A. I think you could make that a little firmer, which is to  
8 say they observe, at least in this period, only transactions  
9 on another platform.

10 Q. Then we have 5.6 percent that transacted some on iOS and  
11 some on -- sorry -- only on iOS; correct?

12 A. That's correct.

13 Q. And 2.8 that transacted some on iOS and some on other  
14 platforms; correct?

15 A. That's also correct.

16 Q. All right. And do you recall that in your report, you  
17 found that the 15.8 group of people who purchased only on the  
18 Sony and other devices accounted for 65.4 percent of the spend  
19 by people who ever accessed *Fortnite* on iOS; correct?

20 A. Sorry. Which -- which number are you referring to  
21 specifically?

22 Q. I am referring to the 15.8 percent.

23 A. Oh, divided by the sum of the three pies?

24 Q. Yes.

25 THE COURT: And they accounted for what?

1           **MR. EVEN:** I'm sorry, Your Honor?

2           **THE COURT:** I was trying to understand your  
3 statement, your question. Of that 15.8 percent, 65 percent  
4 did what?

5           **MR. EVEN:** Not of the 15.8 percent, Your Honor.

6           **Q.** Mr. Hitt, do you remember that in your report --  
7 Professor Hitt, sorry -- you allocated revenue to these three  
8 groups; correct?

9           **A.** I've done calculations that focus on spending on iOS and  
10 so forth. I think you'd have to point me to the one that you  
11 think -- that you're talking about, but, yes, I've done those  
12 calculations.

13           **Q.** And you found that 65.4 percent of all the spend by people  
14 who accessed *Fortnite* on iOS spent all that money only on  
15 other -- only on other platforms; correct?

16           **A.** Let me just clarify.

17           So the number you're citing here is 15.8 divided by those  
18 three pie charts, correct? I'm just not sure which number you  
19 are referring to. That seems about right, but I'm not sure  
20 what you're talking about.

21           **THE COURT:** Which three pie charts are you talking  
22 about?

23           **THE WITNESS:** So -- well, I will leave it to Mr. Even  
24 to explain, but I think that's the number if you take the  
25 15.856 and 28, add them up, and then -- as the denominator and

1 then 15.8 as the enumerator, but I'm not sure.

2 **MR. EVEN:** Your Honor, I'll move on.

3 **THE COURT:** Do you want us to switch back to

4 Mr. Rudd, or do you still want the overhead?

5 **MR. EVEN:** I want the overhead for now.

6 **THE COURT:** Okay.

7 **MR. EVEN:** Thank you, Your Honor. I apologize,  
8 Your Honor.

9 **Q.** Mr. Hitt, do you recognize Exhibit 13 from your rebuttal  
10 report?

11 **A.** Yes. Good.

12 **Q.** And do you see that here you said only from iOS, that's  
13 the first group, that is 23.1 percent of spending by iOS users  
14 on *Fortnite*; correct?

15 **A.** Yes. That's correct.

16 **Q.** And these are people who only ever transacted in *Fortnite*  
17 on iOS; correct?

18 **A.** That's correct.

19 **Q.** Is this --

20 **A.** I'm sorry. Sorry. Which number are we referring to?

21 **Q.** That 23.1 percent, sir.

22 **A.** Oh, yes. Yes. Sorry.

23 **Q.** And then we have 11.5 percent, and those are people who  
24 transacted some on iOS and some on other platforms; correct?

25 **A.** Yes. That's correct.

1 Q. And then we have 64.5 -- 65.4 percent of people who only  
2 ever transacted on Sony PlayStation, Xbox, etc.; correct?

3 A. That's correct.

4 Q. Okay. Now, you would agree with me that if Apple, for  
5 instance, raised the price on the distribution of *Fortnite* on  
6 iOS, that would not affect the people -- the transactions --  
7 the 65.4 percent transactions; correct? Those are  
8 transactions that never touched iOS in any way, shape or form;  
9 correct?

10 A. So it wouldn't -- if the consumers continued to behave as  
11 they have in the past, that would not affect that group.

12 Q. Because if I sometimes opened my *Fortnite* on iOS but I  
13 transact on Sony, the fact that Apple increased its prices, it  
14 doesn't affect me; correct?

15 A. Yes. That's correct. If you -- again, all else equal,  
16 but, yes, that would be the case.

17 Q. And so when you looked at what happened after August 13  
18 and you started talking about the retention rate, you included  
19 those transactions in the 85 number; correct?

20 A. Yes. I separated those numbers into the components, and  
21 the 85 number does include that group, absolutely.

22 Q. And by including those folks in your retained revenue  
23 number, you begin your revenue retention exercise with a  
24 guaranteed retention rate of 65.4 percent of all *Fortnite*  
25 income from people who ever opened *Fortnite* on iOS; correct?

1       **A.**   No.

2       **Q.**   I'm sorry?

3       **A.**   No.

4       **Q.**   Sir, you began the exercise with a retention rate of 65.4  
5       percent; correct?

6       **A.**   It doesn't work that way. I can clarify, if you --

7       **Q.**   No, thank you.

8           Do you remember that you were deposed by me?

9       **A.**   Uh-huh.

10               **THE COURT:** Is that a "yes"?

11               **THE WITNESS:** Yes.

12       **BY MR. EVEN:**

13       **Q.**   And do you remember that in your deposition, I asked you  
14       that question?

15       **A.**   I think you may have, yes.

16               **MR. EVEN:** And, Your Honor, if I may --

17               **THE COURT:** I'm getting it. So you gave me two big  
18       binders. What I don't see is the deposition is supposed to be  
19       Tab 7 and I only have through Tab 4.

20               **MR. CARVAJAL:** Tab 2, Your Honor.

21               **MR. EVEN:** Tab 2 I'm being told.

22               **THE COURT:** I just need his deposition transcript.  
23       Okay. Mr. Even, page and line number?

24               **MR. EVEN:** This is page 296, lines 13 to 24,  
25       Your Honor.

1           **THE COURT:** Okay. Proceed.

2           **BY MR. EVEN:**

3           **Q.** Professor Hitt, do you recall that I asked you, "That  
4           would mean that by including those folks in your retention  
5           number at the top row, you begin the exercise with a retention  
6           rate of 65.4 percent; correct?"

7           And there is some colloquy, and then you say, "Yeah, I  
8           believe that is correct, yes."

9           **A.** Yes. As a practical matter, that's correct.

10          **Q.** Sir, did you give this answer?

11          **A.** Yes.

12          **THE COURT:** So, Professor Hitt, the way this works is  
13          they get to read this and you can --

14          **THE WITNESS:** Okay.

15          **THE COURT:** -- be subject to redirect.

16          **THE WITNESS:** Sorry.

17          **BY MR. EVEN:**

18          **Q.** And, in fact, from the other two groups, the 23.1 percent  
19          that Epic obtained from people who only ever purchased on iOS  
20          and the 11.5 that sometimes purchased on iOS and sometimes on  
21          others, Epic only retained about 50 percent; correct?

22          **A.** That's correct. That's the empirical result.

23          **Q.** Sir, you hold a bachelor degree and graduate level degrees  
24          in electrical engineering; correct?

25          **A.** That's correct.

1 Q. And a Ph.D. in management; correct?

2 A. That's also correct.

3 Q. And you previously taught at the Sloan School of  
4 Management; correct?

5 A. That's correct as well.

6 Q. And you are now at the Wharton Business School; correct?

7 A. Yeah. The chronology is a little bit different than you  
8 suggested. I taught for one semester on leave, but I've been  
9 at Wharton for 25 years.

10 Q. Okay. Thank you for that correction.

11 You've never been accepted as an expert witness by any  
12 U.S. court on the topic of antitrust economics; true?

13 A. That's correct. No other cases I have been involved in  
14 went to trial.

15 Q. And prior to this case, you've never filed a report in any  
16 case on the topic of market definition; correct?

17 A. That's correct.

18 Q. And you've never published any books or papers  
19 specifically about market definition; correct?

20 A. That's correct.

21 Q. And, in fact, you've never published books or papers  
22 specifically about antitrust; is that correct?

23 A. Yes. I think that's correct. There is no publication I  
24 have that is specifically antitrust.

25 Q. And you have also never published books or papers



1 specifically about the antitrust implications of two-sided  
2 markets; correct?

3 **A.** That's correct.

4 **Q.** Yesterday you were asked by the Court some questions about  
5 the recent Apple small business plan. Do you recall that?

6 **A.** Yes.

7 **Q.** And you told the Court that your understanding was that  
8 Apple has explained that they wanted to support innovation  
9 with that program. Do you recall that?

10 **A.** Yes. That's my understanding.

11 **Q.** And you presented the small business program in your slide  
12 10, I believe, as an example of App Store commission  
13 decreases; correct?

14 **A.** I'll take your word on the slide, but, yes, I presented  
15 that.

16 **Q.** And you presented that as a sign of decreasing  
17 commissions; correct?

18 **A.** Yes. 30 to 15 for those developers who qualify.

19 **Q.** And the small business program lowered the rate on the  
20 developers making less than one million a year from 30 percent  
21 to 15 percent; correct?

22 **A.** Yes.

23 **Q.** In late 2020 or early 2021, before the program was  
24 adopted, are you aware of any other platform lowering its  
25 commission rate?

1     **A.** So I don't recall the precise timing, but I believe Valve  
2     lowered its commissions for very large developers. I don't  
3     recall exactly when that occurred dropping from 30 to 25 to  
4     20, depending on how large you were. So I believe that's one  
5     case.

6             I don't believe this -- I cited it in my report, but there  
7     may have been a Microsoft announcement as well, but I only  
8     vaguely recollect that.

9     **Q.** And do you recall that the Epic decline was in 2018?

10    **A.** What are you referring to is the Epic decline?

11    **Q.** Sorry. The Steam decline was in 2018?

12    **A.** I don't remember when they announced that. It's probably  
13    in my report, but I don't have it off the top of my head.

14    **Q.** Okay. You're not aware of any relationship between the  
15    Valve decision to lower its commission in 2018 and the small  
16    business program; correct?

17    **A.** I -- I have no information that would link them directly.

18    **Q.** Okay. And in late 2020 or early 2021, you are also not  
19    aware of any decline in demand for apps or app transactions in  
20    iOS; correct?

21    **A.** There's -- again, it's not something specifically I  
22    examined in that -- that narrow window, but there is nothing  
23    to suggest that from the output data, no.

24    **Q.** And Apple certainly in its public statements did not  
25    suggest that it was lowering its commissions to meet any kind

1 of competitive threat; correct?

2 **A.** I don't recall their full communication, but I don't  
3 recall anything of that form.

4 **Q.** Instead, Apple said it was doing it to support innovation;  
5 correct?

6 **A.** That's my understanding. Again, I don't recall the  
7 specific words, but my general understanding was that was one  
8 of the reasons.

9 **Q.** You testified yesterday that pricing is set by supply and  
10 demand; correct?

11 **A.** That's correct.

12 **Q.** If Apple lowered its price to support innovation, that is  
13 an example where Apple's price was not set by specific supply  
14 and demand forces; correct?

15 **A.** I wouldn't say that, no. I disagree.

16 **Q.** Okay.

17 **A.** It is -- it's a response to -- to enhance the overall size  
18 of the ecosystem which increases revenue.

19 **Q.** Okay. If Apple lowered its price to support innovation,  
20 you believe its current price is profit maximizing?

21 **A.** I don't have any specific opinion on that because I didn't  
22 investigate that, but it -- it very well could be.

23 **Q.** Apple believed that 30 percent apparently was the profit  
24 maximizing price until January 2021; correct?

25 **A.** I -- I don't know what Apple believed, but they did make a

1 decision to lower the price on a certain group, so --

2 Q. Okay.

3 A. -- they may have decided that some conditions had changed  
4 at some point that would make that beneficial.

5 Q. And have you seen any data to suggest that Apple could not  
6 tomorrow increase the price back to 30 percent and that  
7 increase would be profitable?

8 A. I've seen no data on the feasibility or the impact of  
9 that.

10 Q. But it's not beyond the pale, is it?

11 A. I don't like to speculate on things I haven't done, but,  
12 you know, many things are possible.

13 Q. People can raise prices from time to time and do it  
14 profitably; correct?

15 A. Given the market circumstances, yes.

16 Q. In any event, Apple understood as of early 2021 that a  
17 reduction in commission from 30 percent to 15 percent would  
18 support innovation; correct?

19 A. Again, that's my understanding broadly.

20 Q. And you don't disagree with Apple that lowering Apple's  
21 commission rate from 30 percent to 15 percent would support  
22 innovation; correct?

23 A. I have no reason to doubt that that's their motivation,  
24 and it seems plausible to me.

25 Q. Thank you.

1 Now, you showed the Court yesterday several charts showing  
2 growth in game transactions, app transactions, developer  
3 revenues. Do you recall these?

4 **A.** Yes.

5 **Q.** In putting these slides together, have you done any work,  
6 any modeling, for example, of how these indices would grow in  
7 a but-for world without Apple's restrictions?

8 **A.** So I haven't done a formal structural model, but there are  
9 benchmarks that you can compare it to.

10 **Q.** Have you done any work, sir, to model what those growth  
11 rates would be without Apple's restrictions?

12 **A.** No. As I said, I haven't done a structural model or  
13 anything of that form.

14 **Q.** And you're aware, are you not, that in March 2008, Steve  
15 Jobs publicly stated that Apple does not intend to make any  
16 money from the App Store; correct?

17 **A.** Yes. I recall that quote.

18 **Q.** And have you done any modeling to show how transactions  
19 and developer revenue would have grown in a but-for world  
20 where Apple kept Mr. Jobs' promise?

21 **A.** I don't know if you -- I'd characterize it as a promise.  
22 It's a statement. But, no, I've done no modeling of that.

23 **Q.** Now, sir, given your background, I'm assuming you are  
24 familiar with Moore's Law; correct?

25 **A.** Yes. I teach Moore's Law.

1 Q. And Moore's Law observes that the number of transistor  
2 doubles every two years or so; correct?

3 A. Good enough. Yeah. That's close enough.

4 Q. And the transactions we're talking about are digital  
5 transactions; correct?

6 A. They are.

7 Q. And they derive value from the improvements in iPhone  
8 chips and iPhone screens and other iPhone hardware; correct?

9 A. Yes. And the integration thereof, sure.

10 Q. Now, in putting together your slides, have you taken any  
11 steps to control for Moore's Law or for the general immense  
12 progress the iPhones and smartphones more generally have made  
13 in the past 13 years?

14 A. I'm not sure what you mean by control.

15 Q. I mean you've looked at revenues from the App Store,  
16 you've looked at number of transactions on the App Store.

17 Have you done anything to control for things that had  
18 nothing to do with the App Store necessarily or with the  
19 restrictions at issue such as the fact that iPhone's gotten  
20 better?

21 A. So I didn't do any modeling of that form. I don't think  
22 it's appropriate, but, no, I didn't do anything.

23 Q. Okay. And the transactions you analyzed are often done  
24 over a cellular network; correct?

25 A. They can be. These are network devices, WiFi, cellular.

1 Q. And cellular connectivity and cellular network reach and  
2 cellular bandwidth and cellular speeds have all grown  
3 exponentially since 2008; correct?

4 A. That's correct, yes.

5 Q. And so, for instance, today we can stream movies which we  
6 couldn't do in 2008; correct?

7 A. I'm not sure that statement is correct, but certainly the  
8 capability has gotten better over time dramatically.

9 Q. Okay. You recall Mr. Jobs standing and announcing the  
10 second version of the iPhone and miraculously downloading a  
11 picture in like 22 seconds?

12 A. I may have seen that in the past. I don't recall.

13 Q. Okay. That didn't seem like the technology was really  
14 ready for streaming movies over cellular, did it?

15 A. Over cellular, not at full resolution and at full quality,  
16 no.

17 Q. And today we can stream apps on cellular; correct?

18 A. Yes. We're getting there.

19 Q. And we couldn't do that in 2008; correct?

20 A. I -- I think that's fair.

21 Q. And today we can have video chats over Zoom or FaceTime;  
22 correct?

23 A. Perhaps too often, yes.

24 Q. And we couldn't do that over cellular connectivity in  
25 2008, could we?

1     **A.** I don't know. I don't think it was widely available. It  
2     was -- you know, YouTube was accessible, but a lot of the  
3     stuff we have now relies on heavy bandwidth.

4     **Q.** YouTube can buffer; right?

5     **A.** Yes.

6     **Q.** And FaceTime cannot; correct?

7     **A.** I don't want to speculate about that. There existed video  
8     technology that existed before, but I will not disagree that  
9     it's gotten dramatically better.

10    **Q.** Okay. And today, we can play multiplayer games over  
11    cellular such as *Fortnite* or *PUPG* or any other game like that  
12    and we couldn't do that back in 2008; correct?

13    **A.** That's correct.

14    **Q.** And all of this growth in cellular technology had nothing  
15    to do with Apple's restrictions on the App Store; correct?

16    **A.** As you have narrowly defined the question, that's correct.

17    **Q.** And when putting together your growth slides, have you  
18    done anything to control for the immense growth in cellular  
19    capabilities between 2008 and 2021?

20    **A.** So there's -- there's no controls in there because, again,  
21    I don't believe it's appropriate to remove the innovations  
22    Apple has contributed.

23    **Q.** Have you done any analysis that suggests that the growth  
24    rates you showed yesterday had anything to do with Apple's  
25    restrictions?



1     **A.** Apple's restrictions? No. It's --

2     **Q.** Thank you.

3     **A.** The growth is part of the ecosystem.

4             **THE COURT:** Two minutes, Mr. Even.

5             **MR. EVEN:** I'm sorry, Your Honor. Two minutes?

6     Thank you. So I can do a quick thing.

7     **Q.** You relied on some of Apple's other experts in forming  
8     your opinions; correct?

9     **A.** Yes, I did.

10    **Q.** You relied on Professor Schmalensee?

11    **A.** Yes, I did, for the two-sided market issues.

12    **Q.** And you relied on Professor Lafontaine's framework for  
13    market definition; correct?

14    **A.** That's correct as well.

15    **Q.** You relied on the results of Professor Hanssens' survey;  
16    correct?

17    **A.** Yes.

18    **Q.** Now, before undertaking your engagement in this case, you  
19    understood that the hypothetical monopolist test is a  
20    well-accepted test that can be used to define a relevant  
21    market; correct?

22    **A.** Yes. It has been for some time.

23    **Q.** And just like Professor Lafontaine, you, too, did not  
24    perform a hypothetical monopolist test in this case; correct?

25    **A.** That's correct.

1 Q. And you also have never done a SSNIP test in this case or  
2 any case; correct?

3 A. Yes. I believe that's correct.

4 Q. Now, before you decided not to undertake any type of  
5 hypothetical monopolist test in this case, you did not make  
6 any effort to investigate whether any U.S. court or antitrust  
7 agency has defined or accepted a relevant market without  
8 performing some kind of hypothetical monopolist test; correct?

9 MS. RICHMAN: Objection.

10 THE COURT: He either did -- what's the objection?  
11 He either did or didn't consider it.

12 MS. RICHMAN: He's an economist, not a lawyer.

13 THE COURT: I understand that, actually, but I'm  
14 assuming the answer here is no.

15 Did you?

16 THE WITNESS: You are correct. The answer is no.

17 THE COURT: He's not -- okay. Is this --

18 BY MR. EVEN:

19 Q. And you're not offering an independent opinion that a  
20 hypothetical monopolist test is unnecessary in this case;  
21 correct?

22 A. Could I hear the question again, please?

23 Q. You're not offering an independent opinion that a  
24 hypothetical monopolist test is unnecessary here; correct?  
25 You are relying on Professor Lafontaine for that?

1       **A.** I'm not offering an opinion of that form.

2               **THE COURT:** Is this a good place, Mr. Even?

3               **MR. EVEN:** Yes, Your Honor.

4               **THE COURT:** All right.

5               Per earlier discussion, I don't know if you heard, but,  
6       Professor Hitt, you are instructed not to talk to any of the  
7       parties or lawyers during the break.

8               We will stand in recess for 20 minutes. Thank you.

9                       **(Recess taken at 10:15 a.m.)**

10                      (Proceedings resumed at 10:36 a.m.)

11               **THE COURT:** We are back on the record. The record  
12       will reflect that the parties are present. The witness is on  
13       the stand. You may proceed.

14               **MR. EVEN:** Thank you very much, Your Honor.

15                               **CROSS-EXAMINATION**

16       **BY MR. EVEN:**

17       **Q.** Professor Hitt, you believe that products that are central  
18       to the conduct at issue must be within the product market,  
19       correct?

20       **A.** Yes.

21       **Q.** And the products you focused on in this case are the  
22       initial download, re-download, update and in-app purchases of  
23       game content between developers and consumers, correct?

24       **A.** Yes.

25       **Q.** And transactions from nongame apps are not part of your

1 market, correct?

2 **A.** They are not part of the games transaction market, no.

3 **Q.** So Spotify, for instance, is outside the market, correct?

4 **A.** That's correct.

5 **Q.** And Netflix is outside the market, correct?

6 **A.** Yes.

7 **THE COURT:** Did you -- and I'll take this, but I'm  
8 curious whether you did any clustering in testing the market  
9 definition that you rejected in your informal discussions with  
10 the others as you were collaborating in defining the market.

11 **THE WITNESS:** So if you're meaning -- so there's two  
12 types of things you can investigate. You can investigate  
13 whether games is too broad or too narrow. It sounds like  
14 you're suggesting it's too narrow. There were some analyses  
15 that I did to suggest that the underlying economic  
16 considerations that apply to games are different than other  
17 kinds of apps.

18 **THE COURT:** But did you do, for instance,  
19 entertainment or some kind of clustering of apps where in-app  
20 purchases were driving the economics for the developers as  
21 opposed to -- you know, as opposed to others where everything  
22 is free?

23 **THE WITNESS:** So -- so, yeah, I think you highlighted  
24 on one of the things we did look at, which is the monetization  
25 mechanisms. Games, in particular are unique, at least very,

1 very different if you look at that, because they rely very  
2 heavily on in-app purchases of individual items; whereas, for  
3 example, entertainment is very subscription-driven. And other  
4 things, for example, social media is very advertising-driven.

5 So there is a sequence of analyses that I did where I  
6 looked at the various genres and compared some of the  
7 monetization schemes. And games, especially on the IAP area,  
8 really stand out as being very different from all the others.

9 **THE COURT:** Are those tests that you did, were those  
10 disclosed in your report?

11 **THE WITNESS:** Yes. There is a series of graphs in my  
12 written direct. And there's more in my rebuttal, but I  
13 focused on -- the one you just alluded to is in there.

14 **THE COURT:** Okay. Mr. Even.

15 **MR. EVEN:** Thank you, Your Honor.

16 **BY MR. EVEN:**

17 **Q.** And you recall telling me in your deposition that if  
18 Spotify brought the same complaint with the same allegations,  
19 that would require a different market analysis, correct?

20 **A.** Yes. You would want to look at how Spotify -- what the  
21 alternatives would be for Spotify as compared to an Epic or  
22 other game provider.

23 **Q.** Because the harm to Spotify is different than the harm to  
24 Epic, in your view?

25 **A.** I don't know that. What I do know is that there is -- the

1 underlying economics could be different, and it is important  
2 to evaluate that.

3 **Q.** The focus is on the harm to the plaintiff and not to  
4 competition generally?

5 **A.** I don't know how to answer that one way or another. I  
6 would focus on -- I'm focused on the harm to competition, but  
7 certainly you want to pay attention to what product is offered  
8 by the plaintiffs so you can do the relevant part of relevant  
9 market.

10 **Q.** Okay. When you decided to focus solely on games, you  
11 understood that Epic publishes some *Unreal Engine* apps,  
12 correct?

13 **A.** Yes.

14 **Q.** You understood those are not games?

15 **A.** They support game development, but they are not games. I  
16 believe they are essentially DevTools.

17 **Q.** That means they are not games, correct?

18 **A.** They are not games.

19 **THE COURT:** You said development tools?

20 **THE WITNESS:** Yes. I would have to go back and look  
21 exactly what they are, but one looked like, for example, an  
22 app that allows you to do testing. There is some other things  
23 like that, but I don't recall exactly all of them right now.

24 **BY MR. EVEN**

25 **Q.** And you understand that *Unreal Engine* serves, beyond

1 games, other uses, correct?

2 **A.** Yes.

3 **Q.** And so these are DevTools for other kinds of apps,  
4 correct?

5 **A.** They could be. The media -- I know it is used for media  
6 content generation. I haven't really thought about whether  
7 that goes into an app or some other kind of media production.

8 **Q.** But it could, correct?

9 **A.** Presumably, yes.

10 **Q.** You understood that Epic publishes *Houseparty*, correct?

11 **A.** Yes.

12 **Q.** And *Houseparty* is a social app which would not be within  
13 the games market you've articulated, correct?

14 **A.** That's correct. There are some connections between  
15 *Fortnite* and *Houseparty*, but it is a social media app.

16 **Q.** You also have not analyzed the allegations related to  
17 Epic's ability to offer EGS on iOS, correct?

18 **A.** Not specifically, no. I've analyzed the game market, but  
19 I haven't focused on EGS as an app, for example.

20 **Q.** You remember you told me in your deposition that you've  
21 personally not analyzed the allegations related to entry of  
22 the EGS?

23 **A.** That's correct.

24 **Q.** When a user on the Epic game store obtains an app that is  
25 not a game, is that a digital game transaction?

1     **A.** It's a digital transaction, but not a game transaction.  
2     So that would be no.

3     **Q.** You also didn't do any analysis on payment systems,  
4     correct?

5     **A.** That's correct. That wasn't within my scope.

6     **Q.** In defining a game transaction market, you have not  
7     offered any kind of definition of what a game is, correct?

8     **A.** Not specifically, no. I rely on self-identification. At  
9     least for my analyses.

10    **Q.** You assumed *Roblox*, for instance, is a game, correct?

11    **A.** I don't assume. I relied on classifications provided by  
12    developers in doing my analysis.

13    **Q.** And what was the classification that you relied on?

14    **A.** There is a genre designator, and then within genre, there  
15    is also subgenres. And within games, there are many  
16    subgenres.

17    **Q.** Have you consulted with anyone at Apple whether they  
18    consider *Roblox* a game or nongame?

19    **A.** No.

20    **Q.** You agree with me, sir, that as between the two market  
21    definitions before the Court, Epic's and Apple's, only Epic's  
22    market actually includes all the Epic apps that we just  
23    discussed, correct?

24    **A.** Yes. *Houseparty* is outside the games transaction market.  
25    So that would be yes.



1 Q. You talked a little bit in your -- towards the end of your  
2 testimony about friction. Do you remember that?

3 A. Yes.

4 Q. It is fair to say, isn't it, that whatever you think of  
5 the level of friction, if a developer believes it cannot move  
6 enough of its customers to a different transaction platform in  
7 the face of a price increase, then that friction is relevant  
8 to antitrust analysis, correct?

9 A. It could be, yes.

10 Q. And you have not presented any data, for instance, on how  
11 long the process of purchasing content outside a game app  
12 would take, correct?

13 A. I did, as part of my backup, examine how long it took to  
14 purchase V-Bucks through a web browser, but I didn't do a  
15 systematic analysis of all the other ways in which you might  
16 go across platforms.

17 Q. You haven't done any systematic study to see how many  
18 transactions a game developer would lose if they tried to  
19 encourage users to make purchases outside of the app instead  
20 of in app, correct?

21 A. I think the studies I've done would be -- on that  
22 specifically would apply to media apps, so not specifically in  
23 games.

24 Q. Sir?

25 A. Yes.

1 Q. Do you remember I asked you this question in your  
2 deposition?

3 A. I actually don't recall, but you could have.

4 Q. So you may turn to page 121, beginning on line 23 of your  
5 deposition.

6 THE COURT: Hold on. Well, I had his deposition.

7 MR. EVEN: I believe you had it twice by now, Your  
8 Honor. But if you need, I will get you his binder.

9 THE COURT: Maybe it's just marked differently.

10 MR. EVEN: It is supposed to be in binder 1, tab 2,  
11 Your Honor, if that is helpful. Okay.

12 THE COURT: Okay. I do have it twice. You can send  
13 this one back. I think it belongs to Mr. Carvajal. Line --  
14 page --

15 MR. EVEN: 121, Line 23, Your Honor.

16 THE COURT: Okay. Go ahead.

17 BY MR. EVEN:

18 Q. Sir, if you look at the cite that I just gave to the  
19 Court, 121:23, you see that I asked you:

20 "Okay. Have you done any kind of study to see how  
21 many transactions a game developer could lose if he  
22 did try to encourage to make purchases outside of the  
23 app instead of in app?"

24 Ms. Richman objected.

25 You said: "So -- so that is not a study I have

1 done."

2 Do you see that?

3 **A.** Yeah, that is consistent with my prior answer.

4 **Q.** Sir, did you see that you said that in your deposition?

5 **A.** Would you give me the cite, please?

6 **Q.** It is 121:23.

7 **THE COURT:** You can either move on or -- unless you  
8 want him to affirmatively admit that he said that.

9 **MR. EVEN:** I will just stipulate that he said that  
10 and move on, Your Honor. Thank you.

11 **BY MR. EVEN:**

12 **Q.** Sir, you agree that developers want to maximize their  
13 profits, correct?

14 **A.** In general, yes, that is a standard assumption.

15 **Q.** If a game developer or another app developer could  
16 convince enough users to execute their transactions on a web  
17 browser instead of in app on iOS, that could save the  
18 developer the cost of the 30 percent Apple commission,  
19 correct?

20 **A.** Yes.

21 **Q.** So developers are highly incentivized to try and do that  
22 if they think they can, correct?

23 **A.** Yes. That's fair.

24 **Q.** And yet in your deposition, you were unable to identify a  
25 single game developer that was actively trying or had tried to

1 encourage users to make purchases outside of their game,  
2 correct?

3 **A.** I don't recall the context, but it is not -- I've done  
4 studies where developers can transact. I don't believe I have  
5 done anything about developers' intentions. I can only  
6 observe outcomes.

7 **Q.** I didn't ask about intentions, sir. I asked whether you  
8 were able to identify a single game developer that was  
9 actively trying or had tried to encourage people to go and  
10 transact outside of the app.

11 **A.** Right. And it's the "trying" part is the part I haven't  
12 done. I have observed --

13 **Q.** I'm sorry. Trying is an observable issue, right? When a  
14 developer tries to encourage people to move somewhere, they  
15 are not trying in their heart, they're not praying. I mean  
16 trying by actually advertising, pushing people to do it,  
17 making the in-app purchase harder, giving a discount. You  
18 have not seen any of that, correct?

19 **A.** Outside of Epic, no. I didn't study that, though.

20 **Q.** So I want to speak very quickly about some of the  
21 substitution analysis that you presented today in court. The  
22 first one you said you used a proxy about downloading a --  
23 what you called a companion app, correct?

24 **A.** Yes.

25 **Q.** And you said that's a proxy for people buying new consoles

1 or starting to play more, correct?

2 **A.** Yeah, I think that is two of the scenarios, either  
3 acquiring or intending to make greater use of that would  
4 motivate the download of the app.

5 **Q.** Before selecting that proxy, you never did any research to  
6 validate the proxy as approximating the target population you  
7 were trying to identify, correct?

8 **A.** We discussed this in my deposition.

9 No, I used the logical connection.

10 **Q.** You have not done any study, correct?

11 **A.** That's correct.

12 **Q.** In your Switch study you testified today, and you also  
13 said so in your written testimony, that consumers that started  
14 playing *Fortnite* once it became available on Nintendo Switch  
15 shifted a substantial amount of time and money spent from  
16 iOS to Nintendo Switch, correct?

17 **A.** That's fair.

18 **Q.** Now, you've identified roughly 150 million *Fortnite* users  
19 that at some point sign into their account on iOS, correct?

20 **A.** That's correct.

21 **Q.** And of all of those *Fortnite* users on iOS, your Switch  
22 analysis focused on under half a million iOS *Fortnite* users  
23 who began playing on the Switch in June 2018, correct?

24 **A.** That's correct. I believe the number is 457,000.

25 **Q.** So even if we were to accept your analysis as showing some

1 kind of switching, all it could show at most was that 0.3 or  
2 0.4 percent of the iOS *Fortnite* user population moved some of  
3 its *Fortnite* time to the Nintendo Switch after *Fortnite*  
4 launched on the Switch, correct?

5 **A.** That's literally true. I believe it generalizes by --

6 **Q.** Thank you.

7 **A.** -- the nature of the experiment.

8 **Q.** Thank you, Professor.

9 I want to talk briefly about your calculation of what you  
10 call the average Apple commission rate, which you say  
11 declined, correct?

12 **A.** Depends on which one; but, yes, I understand probably.

13 **Q.** And to calculate this rate, you took the commission rate  
14 for each transaction and performed a simple average across  
15 transactions in fiscal year 2019, correct?

16 **A.** Which specific one are we talking about? And then I can  
17 be a bit sharper.

18 **Q.** Regardless of the chart, what you've done to calculate the  
19 average commission is to do a simple commission and then  
20 assign a zero commission value to free transactions, correct?

21 **A.** That's consistently true, yes.

22 **Q.** So I want to talk briefly about -- and see how that worked  
23 in reality.

24 And so if I can put on slide number 1. And what we see  
25 here is we have two transactions. One is a \$10 transaction at

1 30 percent where Apple takes a cut of three, right? You see  
2 that?

3 **A.** Yes.

4 **Q.** Is that a "yes"?

5 **A.** Yes.

6 **Q.** And the second transaction was at \$0, and Apple collected  
7 zero, correct?

8 **A.** That's correct.

9 **Q.** And you assigned to that a commission rate of 0 percent,  
10 correct?

11 **A.** That is also correct.

12 **Q.** And then the total is that the developer has -- the total  
13 revenue is \$10; Apple's commission is \$10, yet you find a  
14 commission rate of 15 percent by averaging 30 and zero,  
15 correct?

16 **A.** The math is correct. Yes.

17 **Q.** Let's move to the second slide.

18 And so now I've added another transaction. This time  
19 let's say it is a video transaction. So it is \$20 at  
20 15 percent, Apple collects \$3, correct?

21 **A.** Okay.

22 **Q.** The math is correct?

23 **A.** Yes.

24 **Q.** And that brings us to a total revenue of \$20; Apple's  
25 commission is \$3, and what you call the average commission

1 rate is again \$15, correct?

2 **A.** The math is correct, yes.

3 **Q.** So we have here one set of transactions with \$10 to  
4 developers, 3 to Apple and a 15 percent rate, and one 20, 3  
5 and 15 percent rate based on your calculations, correct?

6 **A.** I believe -- I believe that is consistent with the slide.

7 **Q.** Okay. So now I want to bring up Figure 3, your written  
8 direct testimony.

9 And if Mr. Rudd can help us with that. You can enlarge  
10 it.

11 And I want to talk a little bit about your testimony about  
12 availability of top iOS games by revenue and by download.

13 And, first of all, what we can see here is that the  
14 availability that you found for consoles is very low, correct?

15 **A.** It is what it is, 16 and 12 percent, depending on how you  
16 cut it.

17 **Q.** 12 percent means there are three games that are available,  
18 correct?

19 **A.** Yes. In the top 25, yes.

20 **Q.** And the other 23 -- sorry, 22 games are not available,  
21 correct?

22 **A.** Yes, that follows.

23 **Q.** And 16 percent is four games, correct?

24 **A.** That is also correct.

25 **Q.** And the other 21 are unavailable, correct?



1       **A.** Yes, among the top 25, that's correct.

2       **Q.** Among the top 25. One game that appears in both those  
3       populations among the top 25 is *Fortnite*, correct?

4       **A.** Yes, that is one of them.

5       **Q.** So these percentages are now even lower because *Fortnite*  
6       is no longer available in mobile, correct?

7       **A.** I don't know what these percentages are. The market has  
8       changed over time. But when this data was done, this was  
9       correct. *Fortnite* is not there. There may be others in its  
10      place.

11      **Q.** Now, by contrast -- sorry, just one more thing. And then  
12      we go to availability on the iOS browser, the top 25 game  
13      apps by revenue, and that too is very low, correct?

14      **A.** On the revenue one, yes. Well, very low is 12 percent.

15      **Q.** 12 percent. That is, again, three games out of 25,  
16      correct?

17      **A.** That's correct. Number of games you can play in the  
18      browser is three -- is 12 percent.

19      **Q.** By contrast, you say that for PCs, 72 and 88 percent,  
20      respectively, are available, correct?

21      **A.** Yes, that's correct.

22      **Q.** And those numbers are pretty high, correct?

23      **A.** They are certainly higher in approaching a hundred  
24      percent.

25      **Q.** That is the most meaningful statistic here, because

1 everyone understands that Android and iOS really are not  
2 overlapping populations, correct?

3 **A.** So I've seen that asserted. What this shows is that  
4 they -- most game apps and most popular apps are available for  
5 both.

6 **Q.** You don't know what is the overlap between iOS and  
7 Android?

8 **A.** It -- so I do. At any given time, you are unlikely to  
9 have both an iOS and an Android phone, but you might have  
10 devices from both ecosystems and may switch.

11 **Q.** That's what I meant. You don't have both at the same  
12 time, correct?

13 **A.** With phones, yes, but other devices would expand this.

14 **Q.** Professor Hanssens, who will testify here, and you relied  
15 on him, he found that 22 percent of iOS users have access to  
16 Android when that includes in the definition of access, access  
17 with someone's -- with my friend's Android phone, correct?

18 **A.** I believe that's right. Yes.

19 **Q.** And you say in your direct testimony, written direct  
20 testimony that, based on this statistic, the vast majority  
21 were also available on personal computers; i.e., developers  
22 developed the same game for the PC, correct?

23 **A.** Yes. I think that's right.

24 **Q.** So this statistic is intended to show the Court that  
25 developers, when sitting down and thinking, as you said, about

1       their options, they say, I want to launch a mobile and PC  
2       typically, correct?

3       **A.** These are the choices they have made. Some also launch on  
4       console, some also provide a browser version depending on --  
5       it is the developer's choice.

6       **Q.** I understand.

7             The bulk in this sample of top 25 downloads and revenue,  
8       you are suggesting, have made the choice to launch on both  
9       mobile and PC, correct?

10      **A.** The data are what they are. Different developers make  
11      different choices.

12      **Q.** And 88 percent of the games that you found, for instance,  
13      you think the developer made the choice to launch on both,  
14      correct?

15      **A.** I think that's generally right.

16      **Q.** Now, you provided backup materials that contain sourcing  
17      for your PC availability findings, correct?

18      **A.** That's correct.

19      **Q.** And this sourcing was generally in the form of hyperlinks  
20      that are supposed to provide corroboration for each of your  
21      availability assertions, correct?

22      **A.** I believe there are something like 450 of them.

23      **Q.** Okay. I want to walk through some of those, if I may.

24      **A.** Sure.

25             **MR. EVEN:** And so, Your Honor, may I approach with

1 some materials for the witness?

2 **THE COURT:** You may.

3 **MR. BORNSTEIN:** Thank you.

4 **MR. EVEN:** Thank you.

5 **BY MR. EVEN:**

6 **Q.** While you are opening that up, it is going to be a little  
7 cumbersome, I am afraid, but it is big, as you said.

8 So I am giving you what I represent to you is an excerpt  
9 from your backup which corresponds with Figure 3. And this  
10 backup was produced with your rebuttal report and associated  
11 with, I think, your rebuttal report, Exhibit 19, if I remember  
12 correctly.

13 And Mr. Rudd can maybe put it up on the screen as well.  
14 And we'll try and walk through it to try and understand what  
15 you are showing.

16 So, first of all, we have two tabs here. One is called  
17 Data and one is called Sources, right? That is on the screen,  
18 Professor Hitt. You are not going to see the tab name on the  
19 printout.

20 **A.** Okay. It's there. Okay.

21 **Q.** And the first page that you have in what I handed to you  
22 is the Data tab. Okay?

23 **A.** Okay.

24 **Q.** And the last three pages are the Sources tab. Okay?

25 **A.** Okay.

1 Q. And in the Data tab, we walk through it quickly, what we  
2 see, first of all, is rank category, correct?

3 A. Yes.

4 Q. In rank category, we have essentially a number which is  
5 the rank, correct?

6 A. I believe that is correct, yes.

7 Q. Then underscore and either "DL" or "REV," which stands for  
8 download or revenue, correct?

9 A. That's correct.

10 Q. Then games, correct?

11 A. Yes.

12 Q. So, for instance, if I look at the first line, I see that  
13 I have a game that is number 23 in downloads. And if I go  
14 then to row D, which is one to the right, I see that that app  
15 is called Amaze with three exclamation marks, correct?

16 A. That's correct. I think the image on the screen is  
17 damaged; but, yes, that's Amaze with three exclamation points.

18 MR. EVEN: Mr. Rudd, if you can fix that, I would  
19 appreciate it.

20 BY MR. EVEN:

21 Q. Ms. Forrest is correcting me that, actually, if you look  
22 at the very top of your sheet, you can see data and sources at  
23 the very top on the printout as well.

24 A. Yes.

25 Q. And then going to row L, which is another one to the

1 right, and you see devices for usage, and you say for download  
2 on desktop or laptop or through web browser, and it says "yes"  
3 or "empty," correct?

4 **A.** Yes.

5 **Q.** And the ones that have "yes" next to them, those are the  
6 ones that you have found out are on a PC or web browser, and  
7 then that goes into the calculation of the 72 percent or  
8 88 percent, correct?

9 **A.** I think that's correct.

10 **Q.** Okay. So with that, let's please move to the Sources tab.  
11 And row A is again the app name, correct?

12 **A.** Yes.

13 **Q.** And then row C, devices for usage, and we have a series of  
14 links, correct?

15 **A.** Yes.

16 **Q.** And if I understand correctly, what we are going to see is  
17 that wherever we have a "yes" in column L, we are supposed to  
18 see some link here for an option to download or play on a web  
19 browser the specific game, correct?

20 **A.** Yes, you should.

21 **Q.** That is the corroboration, correct?

22 **A.** As far as I understand, yes.

23 **Q.** Now, not all this information is for backing up the PC  
24 claim, correct? Because if you look, for instance, at Amaze  
25 or *Aquapark.io*, you see the first two lines are an address in

1 the Apple App Store and in the Google Play store, correct?

2 **A.** Yes. There may be links that are used to identify things.

3 **Q.** That is because you also gave statistics for Android, for  
4 instance, correct?

5 **A.** Yes, I think that's right.

6 **Q.** So I want to go through a few of these lines.

7 Let's start close to the top, and if you look at the Data  
8 tab, you see on what's marked as row 21, you see an app called  
9 *BitLife*. Do you see that?

10 **A.** Yes.

11 **Q.** And you see that in row L, *BitLife* you mark as "yes,"  
12 correct?

13 **A.** That's correct.

14 **Q.** And then if you go to the Sources tab for *BitLife* that is  
15 on row 14, you see that you only give a Google Store link,  
16 correct?

17 **A.** Yes, that's correct. On this document, yes.

18 **Q.** And so this document does not provide corroboration that  
19 *BitLife* is available on PC, just on Android, correct?

20 **A.** I'd have to look at the link to see if there is something  
21 else there. I do know that some of the links didn't make it  
22 into the backup at one point. I believe that was addressed.

23 **Q.** Okay. This is the latest that we have of this backup, but  
24 we will continue researching.

25 Let's Google for a second. I will ask Mr. Rudd to Google

1     *BitLife Life Simulator* on the App Store. That is *BitLife* on  
2     the App Store.

3             Do you see that?

4     **A.** Yes.

5     **Q.** And do you see that it is by a developer called  
6     Candywriter, LLC?

7     **A.** Yes.

8     **Q.** And if we scroll down, Mr. Rudd, and go to the developer's  
9     website, you see what has come up, Professor Hitt?

10    **A.** Yes.

11    **Q.** And do you see that that is Candywriter, the publisher,  
12    saying: Find all of our games in your favorite App Store.

13             The Apple App Store or Google Play, correct?

14    **A.** That's correct.

15    **Q.** And there is no link to a web browser and there is no link  
16    to a PC download, correct?

17    **A.** I don't see one here, no.

18    **Q.** So we started at the top. Let's jump towards the end of  
19    the list. And I want to go to something called *Words Story*,  
20    which is on row 84. Sorry, in the Data tab. I'm in the Data  
21    tab. You see *Words Story*, Professor Hitt?

22    **A.** Yes, I do.

23    **Q.** You see *Words Story* is marked with a "yes" for a web  
24    browser or PC?

25    **A.** Yes.



1 Q. Now let's go to the sources. You are going to have to  
2 flip a few pages, because that is the way W works, it is at  
3 the end. And let's start by following the official Apple  
4 Store link that's on there. That is the last one, I believe.  
5 And let's look at it on the App Store for a second. The App  
6 Store. And that is *Words Story*, correct?

7 A. That looks right.

8 Q. And you see that this is from a developer called  
9 82Trillion, right?

10 A. I think it is 89Trillion, but yes.

11 Q. Okay. 89, sorry. 89Trillion. You were correct. Thank  
12 you.

13 And let's try and go to the developer website here.  
14 That's 89Trillion, correct? And if you go to the Games tab  
15 and scroll down, and let's try and find *Words Story*. Do you  
16 see it?

17 A. Yes.

18 Q. And do you see that it says that it's -- get it on Google  
19 Play download on the App Store? Correct?

20 A. That's what's available on the developer's website, yes.

21 Q. The developer does not point to a PC, correct?

22 A. Not here, no.

23 Q. And not to a web browser, correct?

24 A. That's right.

25 Q. All right.

1           Let's go back to the Sources tab. This one you gave a few  
2           more links, so let's try and exhaust this one. And let's go  
3           to the Microsoft com -- the Microsoft.com store.

4           And this is *Words Story* on the Microsoft store, do you see  
5           that?

6           **A.** Yes.

7           **Q.** And that's by a developer called Super Free Hot Games. Do  
8           you see that?

9           **A.** Yes.

10          **Q.** And it says available on PC, correct?

11          **A.** That's also correct.

12          **Q.** So that is not an example of where the actual developer,  
13          89Trillion, released the game on both PC and iOS, correct?

14          **A.** I don't know the full background. It is available through  
15          the two mobile platforms as well as available from Microsoft.  
16          I don't know what the developer's role in that --

17          **Q.** Sir, this is not the same developer and not the same game,  
18          is it? This is what is called a fake game, what we see here,  
19          right?

20          **A.** It is on the Microsoft store. And my research team did  
21          look at these to see if they are comparable. Yes, it does not  
22          list the same developer.

23          **Q.** Okay. Can we go to the next address, which is Lagged?  
24          You gave that one as well, right?

25          **A.** Yes.

1 Q. And do you see this is on a -- something called Lagged,  
2 and they created a similar graphic and it is not 89Trillion,  
3 and it says -- they are at least honest about it -- based on  
4 the popular mobile game. Do you see that?

5 A. Yes.

6 Q. Okay. I want to jump now to the middle, since we have  
7 been to the beginning and the end. I'm going to try and do it  
8 a little more quickly. And let's go to a game called *Helix*  
9 *Jump*. That's in row 50. And that is another game that you  
10 say is available, correct, on the PC?

11 A. Let me see. Yes.

12 Q. Okay. So -- and let's look at *Helix Jump* from the App  
13 Store. And you see that this is from a developer called  
14 Voodoo?

15 A. Yes.

16 Q. If we go to Voodoo.io, that is the developer website. You  
17 see it? We go to their Games tab, and here is *Helix*. You see  
18 it? *Helix Jump*, half a billion downloads, available on the  
19 App Store and Google Play, correct?

20 A. Yes.

21 Q. No mention of PC, no mention of browser, correct?

22 A. That's correct.

23 Q. While we are here, you see on the right all these people  
24 running under something called *Crowd City*?

25 A. Yes.

1 Q. And *Crowd City* is also on your list of games that are  
2 available on PC?

3 A. I'd have to look. I'll take your word for it.

4 Q. Well, it is row 32 of your Data tab. Do you see that?

5 A. Give me a moment.

6 Q. It is on your screen now, I think.

7 A. Yes.

8 Q. If we go back to Voodoo, who is the developer, you will  
9 see that *Crowd City* is offered by the developer only on the  
10 App Store. Do you see that?

11 A. Yes, that's correct.

12 Q. And if Mr. Rudd scrolls down the page, another game on  
13 your list is Paper.io 2. Do you see that on the right?

14 A. Yes.

15 Q. That is over a quarter billion downloads?

16 A. Yes.

17 Q. And all of them from the App Store and Google Play,  
18 correct?

19 A. Those are the two links that appear on the page.

20 Q. No mention of PC or web browser, correct?

21 A. Not here, no.

22 Q. Let's next go to *Happy Glass* on the App Store. That is  
23 also on your list, correct?

24 A. Again, I would have to see it. It seems familiar.

25 Q. And that's from a developer called Lion Studios. Do you

1 see that?

2 **A.** Yes.

3 **Q.** And if Mr. Rudd follows the developer's link and goes into  
4 games, and scrolls down to "Happy." You can also search for  
5 "Happy," I'm guessing. You see *Happy Glass*?

6 **A.** Yes.

7 **Q.** And you see the developer says that it's available and  
8 mentions only the App Store and Google Play store, correct?

9 **A.** That's correct.

10 **MR. EVEN:** And, Mr. Rudd, can you search for "bullet"  
11 on the same page?

12 **BY MR. EVEN:**

13 **Q.** See *Mr. Bullet*, Professor Hitt? Do you see it?

14 **A.** Yes.

15 **Q.** And *Mr. Bullet* is on your list as something that is  
16 available on PC, correct?

17 **A.** I'd have to check to see if this is exactly the same game,  
18 but it seems to be, yes.

19 **Q.** And that, too, no mention of PC and no mention of web  
20 browser, correct?

21 **A.** Not on the developer site.

22 **Q.** Sir, before putting this list together and representing to  
23 the Court that there is 72 percent or 88 percent available,  
24 have you done anything to check whether these things are  
25 actually available on a PC from the same developer such that

1 it supports your statement that developers decide to  
2 distribute on both mobile and PC?

3 **A.** Yes.

4 **Q.** Okay. But none of it is in your backup and none of it is  
5 what we saw on the developer website today?

6 **A.** There were a few missing links. Some of these things are  
7 available from other sources. And my research team did look  
8 at those links, yes.

9 **Q.** That is what you believe?

10 **A.** That is my understanding.

11 **Q.** Sitting here today, can you tell the Court under oath that  
12 *Color Bump* is available on PC? It is on your list. I'm  
13 telling you that my team has tried, we can't find it on PC.  
14 We have found it on the developer website with the same  
15 available on the App Store or the Google Play store.

16 Can you tell the Court under oath that it is available in  
17 PC?

18 **A.** I would have to follow the links to be absolutely sure.  
19 My understanding was my research team --

20 **Q.** Sir, it's a yes-or-no question. Can you tell the Court  
21 under oath that you've done the work to go and check and saw  
22 this thing loaded on a PC from the same developer?

23 **A.** From the same developer? The developer names may be  
24 different.

25 **Q.** Sir, I am sorry, you put this testimony in and said this

1 shows that developers distribute on both -- the same games on  
2 both web and PC and mobile. That means to be the same  
3 developer, correct? That is the point of your testimony?

4 **A.** The games are available on multiple platforms.

5 **Q.** Sir, I asked you a question.

6 **A.** What?

7 **Q.** The point of your testimony is to show that the same  
8 developer multihomes and distributes on both PC and mobile --  
9 I'm sorry, on both PC and mobile, correct? That is what you  
10 said in your written testimony. I can read it to you.

11 **A.** Okay.

12 **Q.** Developers develop the same game for the PC. That is what  
13 you testified, correct?

14 **A.** Many do, yes.

15 **Q.** None of the ones we saw, correct?

16 **A.** I would have to look at the links. Some of them are  
17 available from other sources that are not the same developer.

18 **Q.** Sir, I just went through 10 links with you on 10 games.  
19 Can you tell the Court under oath today that *Run Race 3D*,  
20 where the developer only mentions App Store and Google Store,  
21 is available for PC? You saw it with your own eyes?

22 **A.** My research team did the investigation for that and did  
23 find -- looked at specifically the availability of the game.

24 **Q.** Sir, this is your testimony, not your research team's.  
25 Can you give the Court the assurance that your 72 percent is

1 correct rather than about 25 percent that our team has been  
2 able to find?

3 **A.** So I disagree with that. There are a number of these  
4 games that are available through emulators.

5 **Q.** Same question, sir, about *Fun Race 3D*.

6 **A.** Okay. It's on the chart, yes.

7 **Q.** And can you give the Court sworn testimony that you have  
8 seen with your own eyes this game from the developer who made  
9 it for the App Store also being available on a PC or web  
10 browser? It is a yes or no?

11 **A.** Not from the same developer, no.

12 **Q.** Same question for *Toy Blast*.

13 **A.** I am sorry. What was that?

14 **Q.** Okay. Let's put that -- let's -- I want to switch gears a  
15 little bit and I want to talk about Figure 8 of your written  
16 direct testimony. It is located at page 51. You see  
17 Figure 8?

18 **A.** I see it on the screen. Let me just grab it.

19 **Q.** That figure is titled "Monetization and Portability of  
20 Fiscal Year 2019 Top Game Apps in the App Store," correct?

21 **A.** Let me just catch up. Yes.

22 **Q.** And this one in the third row goes directly to the Court's  
23 question about whether there are many apps that are available  
24 for somebody to go out of their app, go purchase something  
25 online, on the web browser, on their iPhone and come back,



1 correct?

2 **A.** I think that's right.

3 (Simultaneous Colloquy.)

4 **THE WITNESS:** Let me -- they don't have to leave  
5 their iOS device to go to a web browser. Otherwise, that's  
6 correct.

7 **BY MR. EVEN:**

8 **Q.** Yes. I said they have to leave the app, go to Safari on  
9 their iOS device, purchase and come back, correct?

10 **A.** That's correct. Yes.

11 **Q.** And I'm sorry if I misspoke. You assert in this paragraph  
12 that many game developers allow consumers to purchase digital  
13 content that will be used within iOS from alternative  
14 transaction platforms or through a website. And you  
15 specifically highlight Safari on iOS, correct?

16 **A.** Yes.

17 **Q.** And you say a full one-third offers direct purchases of  
18 content through web browsers on the iOS device for content  
19 that can be accessed on an iOS app.

20 That's what you said, correct? Did I read that correctly?

21 **A.** Yes.

22 **Q.** So let's look at the numbers for a second here. First we  
23 looked at -- we see that for the top 25 by download, it is  
24 only 8 percent, correct?

25 **A.** That's correct.

1 Q. And that is again -- that is two apps that are available,  
2 and the other 23 you can't do that, correct?

3 A. Yes, that follows.

4 Q. And for the top 25 by revenue, you say that 32 percent  
5 make purchases available, correct?

6 A. That is also correct.

7 Q. And I guess 32 percent is what you're referring to as a  
8 full one-third?

9 A. Yes, there may be truncation in there and rounding.

10 Q. So conveniently for us, the backup is the same backup. If  
11 you go to row AA -- sorry, column AA on the Data tab, you see  
12 a few yeses there, correct? And this is under "Sign-in  
13 portability, purchase digital content within web browsers,  
14 access through iOS app." Do you see that?

15 A. Yes.

16 Q. And, again, where we see a "yes," that is something that  
17 goes into the calculation of the 8 percent and 32 percent,  
18 correct?

19 A. That's correct.

20 Q. And is it fair to say that altogether, you've identified  
21 eight games out of this total population of 45 games that you  
22 claim have this capability, correct?

23 A. Yes, that is consistent with 32 percent.

24 Q. Okay. And that's because -- okay. And the only ones that  
25 are available for the top downloads are essentially

1       duplicates, right, because those are *Roblox* that is in the top  
2       25 for both revenue and downloads and *PUBG mobile*, which is  
3       also available in both, correct? We have 10 yeses, but it is  
4       for eight games, correct? Sir, do you see that it's --

5       **A.** There is a lot data on here. Yes, I think that's correct.

6       **Q.** Have you personally examined the possibility of going out  
7       to an iOS Safari, buying something and going back into the  
8       app for each one of those?

9       **A.** Me personally, no. My research team did look into the  
10      availability of that option, though.

11      **Q.** Okay. So you have not personally checked *Big Fish Casino*?

12      **A.** Not me personally.

13      **Q.** Not *Candy Crush*, *Candy Crush Soda*, and *Clash Royale*,  
14      et cetera?

15      **A.** I think that's right, yes.

16      **Q.** So I'm going to ask Ms. Houserman, if she is here, to help  
17      me with this one and walk you through the process -- the  
18      frictionless process that you've described during your direct  
19      testimony.

20             And let's maybe start with *Candy Crush*. Ms. Houserman,  
21      can you Google *Candy Crush*?

22             And we see you can install *Candy Crush*. It is in the App  
23      Store. And there is Twitter. And then eventually we get to  
24      www.king.com, *Candy Crush Saga* online?

25      **A.** Yes, King is the developer.

1 Q. If we click on it, it gives us the possibility to install,  
2 correct?

3 A. So it would seem.

4 Q. If I press "Install," what happens, Professor Hitt?

5 A. It looks like it takes you back to the iOS store.

6 Q. Exactly. So let's go back and scroll further down, and  
7 you see a bunch of boxes here: Apple App Store, Google Play,  
8 Amazon, Microsoft store, Facebook, and Play on king.com. Do  
9 you see?

10 A. Yes.

11 Q. Let's try "Play on king.com," which sounds the most like a  
12 web browser experience, correct?

13 A. It could be.

14 Q. Well, from the stores, I'm not going to get a web browser  
15 experience, correct?

16 A. Not from the iOS App Store.

17 Q. And not from the Google and not from the Microsoft store,  
18 correct? They are going to sell me apps?

19 A. I don't know about Microsoft, but the other two, yes.

20 Q. Let's try king.com. And what does it say, Professor Hitt?  
21 You see what it says?

22 A. Yes. "Available on desktop."

23 Q. Only available on desktop, correct?

24 A. Yes, that's correct.

25 Q. Okay. Let's go back and find it on Facebook maybe. And

1 this version, too, is only available on desktop, correct?

2 **A.** That's what it says.

3 **Q.** Okay. That's part of the frictionless process that you  
4 have envisioned, correct?

5 **A.** I wouldn't characterize it that way. My understanding is  
6 you can transact through a web browser.

7 **Q.** Do you want to tell Ms. Houserman where she should go to  
8 do this?

9 **A.** I would have to look through and go back --

10 **THE COURT:** Is there not CandyCrush.com?

11 **MR. EVEN:** No, it is king.com, Your Honor. That is  
12 the developer. And we tried, and they don't do it.

13 Ms. Houserman, just if you can do king.com again so the  
14 Court sees where we have tried.

15 **BY MR. EVEN:**

16 **Q.** And that is the version that is only available on desktop,  
17 correct, Professor Hitt?

18 **A.** I am sorry. Give me one moment.

19 **Q.** Do you recall -- and you see on our screen that when we  
20 try on king.com, it doesn't let us do it?

21 **A.** I see what you're showing. I would have to look through  
22 the links in my backup.

23 **Q.** I can try *Candy Crush Soda*, but let's try something from a  
24 different developer. Let's try *Clash Royale*.

25 And, again, we have a link to the App Store that is at the

1 top, always is, Install Now, *Clash Royale*, App Store, About,  
2 they have a Wikipedia site, and eventually we get to  
3 ClashRoyale.com, and that is the developer website, correct?  
4 And we entered the arena.

5 **A.** Okay.

6 **Q.** Do you see that?

7 **A.** Yes.

8 **Q.** And if we can click on the top right-hand corner, you see  
9 "About the Game"?

10 **A.** Yes.

11 **Q.** And if we go to "Parents Guide," you see that?

12 **A.** Yes.

13 **Q.** And let's go to "Privacy and Processing of Personal Data."

14 Do you see under Payment Information, it says: "We do not  
15 store any credit card information related to in-game  
16 purchases, as the payment transactions are completed through  
17 Apple's App Store or Google Play, depending on your device?"  
18 Do you see that?

19 **A.** Yes, that's correct.

20 **Q.** And yet you believe that your team managed to go into a  
21 website and buy legitimate *Clash Royale* money and go back to  
22 the app?

23 That is your testimony?

24 **A.** I would have to follow the links, but my research team  
25 identified the links that that would enable you to do so. I

1 would have to go back and look to be sure.

2 Q. You understand, sir, that the typical user of *Clash Royale*  
3 doesn't have a research team, correct?

4 A. That's -- I would think so, yes.

5 Q. So part of the frictionless process, sir, they cannot go  
6 to a research team of five Ph.D. economists and ask them to  
7 please find how to conduct this transaction, correct?

8 A. They wouldn't have a research team, that's correct.

9 Q. You believe we would get any different results if we tried  
10 *Big Fish Casino*?

11 A. Again, I would have to follow the links that are  
12 highlighted in my report to see what the process is.

13 Q. I'm telling you that our team, which includes quite a few  
14 lawyers, have not been able to do so for *Big Fish Casino*. Do  
15 you have any reason to disagree?

16 Sir, do you have any reason to disagree?

17 A. I'm looking at the document you gave me.

18 Q. I hope it is not going to take so long on each one of  
19 these because I have questions about the other five as well.  
20 Professor Hitt, I'm on the clock.

21 A. I'm looking at the document you provided me. There is a  
22 number of links in the monetization I would have to access.

23 Q. Sitting here today, based on what you've seen, do you have  
24 any reason to disagree with our conclusion that this cannot be  
25 done for these other apps?

1     **A.** My reason to disagree is my research team did investigate  
2     this and has a number of links which I would follow and want  
3     to re-investigate.

4     **Q.** I think we have gone through a few links by your team,  
5     sir, haven't we?

6     **A.** You've gone through -- I haven't done it systematically,  
7     so I don't know --

8     **Q.** Let me move on to a different topic and try and finish.

9             You heard Professor Athey testify the other day that a  
10     developer would want to maintain a relationship with its  
11     customers and would, therefore, be incentivized to provide  
12     cross-wallet functionality, correct?

13     **A.** Yes.

14     **Q.** And Professor Athey also testified that many developers  
15     can't do so because there are expenses associated with it with  
16     developing and maintaining infrastructure necessary for such  
17     cross-wallet functionality and it's difficult to get consumers  
18     to engage in this kind of relationship.

19             Do you recall that?

20     **A.** Broadly, yes.

21     **Q.** And you recall that Professor Athey said that because of  
22     that, the vast majority of developers are not going to do  
23     that, and only the very big ones would, correct?

24     **A.** I believe she said that, yes.

25     **Q.** I can tell you that my team has found that this can be



1 done for three apps. One of them is *Fortnite*, no longer an  
2 app, and the other two are *Roblox* and *PUBG*, two of the biggest  
3 games in the world, and no one else does it on your list.

4 Do you have any basis to dispute that, sir?

5 **A.** Which list are you specifically referring to?

6 **Q.** The list of eight games that you say can do it, we found  
7 three that actually work. One of them is *Fortnite*, one of  
8 them is *Roblox*, one of them is *PUBG*. The others, you can't do  
9 it. As you just saw, one of them says, we are not going to do  
10 it.

11 Do you have any reason to disagree, sitting here under  
12 oath, sir?

13 **A.** Yes, it is my understanding my research team did identify  
14 those things in the backup. I would have to go look at that  
15 to confer.

16 **Q.** That is your reason to disagree?

17 **A.** That's my reason, yes. I trust my research team has  
18 followed these things and has investigated this.

19 **Q.** Sir, you still trust your research team, even now?

20 **A.** Absolutely.

21 **MR. EVEN:** Thank you. I have no further questions  
22 for this witness.

23 **THE COURT:** Redirect.

24 **MR. EVEN:** Sorry, Your Honor, I made a mess. It's  
25 going to take me one minute to clear up.

1           **THE COURT:** Maybe at the end of all this, we can get  
2 the economists to give us their best jokes about economists.

3           **THE WITNESS:** I will just tell the lamppost joke  
4 again, so, you know, that's the classic.

5           **MR. EVEN:** Your Honor, unfortunately, for each one of  
6 those, we have 12 lawyer jokes, so we are in the minority --

7           **THE COURT:** Unfortunately or not, okay. I've heard  
8 some good ones during some of these antitrust cases. You may  
9 proceed.

10                           **REDIRECT EXAMINATION**

11           **BY MS. RICHMAN:**

12           **Q.** Professor Hitt, why don't we start where you ended with  
13 Mr. Even.

14           Does anything you've seen change your analysis that the  
15 majority of game apps in the top 25 list are available for  
16 download both on PC and iOS?

17           **A.** No. My research team followed up on a number of those and  
18 noted that some of them are available through emulators. The  
19 vast majority -- I think even -- there was another calculation  
20 offered by plaintiffs that it's about 50 percent, by their  
21 calculation, as I recall.

22           **Q.** And did your team examine whether very similar or almost  
23 identical games were available on different platforms but  
24 published by different developers?

25           **A.** Yes. There's a number of examples of that, including some

1 fairly prominent ones like *PUBG*.

2 Q. And some of the games that were on Mr. Even's list just  
3 now?

4 A. Yes, that is my understanding.

5 THE COURT: But that list, the big spreadsheet, those  
6 were the 25 that are in here, right?

7 THE WITNESS: That's right. So my research team  
8 would have gone out, looked at -- found the games and looked  
9 at them to see if they believe they were comparable.

10 BY MS. RICHMAN:

11 Q. And why are sometimes very comparable, almost identical  
12 games published by different developers?

13 A. Sometimes they license out the technology to others to  
14 offer a same or similar game, and the experience can be very,  
15 very similar. But some developers choose to let others do  
16 that burden for them.

17 Q. And has anything you've seen here today changed your view  
18 that developers have choices when deciding which platforms to  
19 make their games available on?

20 A. Yes. Regardless, it indicates that these products can be  
21 made available on a number of different platforms in a variety  
22 of different ways, including through things like emulators and  
23 other technologies.

24 Q. And, Professor Hitt, Mr. Even was showing you some  
25 examples of friction associated with downloading games on

1 different platforms.

2 Is that your understanding?

3 **A.** Yes.

4 **Q.** And do you think what he illustrated demonstrates a  
5 realistic -- or portrays a realistic view of the switching  
6 costs -- and frictions between transaction platforms?

7 **A.** I don't think it's broadly applicable. There may be  
8 certain circumstances where it's more difficult than others.  
9 But certainly we also have examples where it's very, very  
10 easy; for example, purchase of V-Bucks.

11 **Q.** Did you yourself attempt to conduct any experiment  
12 purchasing V-Bucks through a mobile browser?

13 **A.** Yes. I own a lot of V-Bucks. I did try a couple of  
14 different ways to buy V-Bucks and found that you can do that  
15 within -- depending on whether you are logged in or not, in a  
16 minute or two.

17 **Q.** Okay. Thank you.

18 **THE COURT:** Did you try it for anything else?  
19 Because it looked pretty difficult, given the examples he  
20 provided.

21 **THE WITNESS:** I personally didn't do these, but my  
22 research team did go through and look at a lot of these.

23 **THE COURT:** Do you have any logical explanation for  
24 why we couldn't get to it during the Cross-Examination?

25 **THE WITNESS:** So there were a number of other links

1 in there, and I recall going through this in detail with my  
2 research team who had shown me games that are either very  
3 similar or they would go through and find a way to do it. I  
4 would have to go through the links that are in the backup in  
5 my report and investigate to see if any of those are, for  
6 example, no longer valid or there was an oversight.

7 **THE COURT:** Did you personally --

8 **MS. RICHMAN:** All right.

9 **THE COURT:** Go ahead.

10 **MS. RICHMAN:** Go ahead, Your Honor.

11 **THE COURT:** Go ahead, Ms. Richman.

12 **BY MS. RICHMAN:**

13 **Q.** You said you personally went through the links -- many of  
14 the links with your research team to verify this?

15 **A.** We spent a fair amount of time going through links and  
16 discussing things like games from multiple developers and  
17 such.

18 **Q.** Professor Hitt, were there any new analysis in your  
19 written direct testimony?

20 **A.** Not that I recall. There were a couple of graphs and some  
21 things that can be calculated from numbers, but I think that  
22 was it.

23 **Q.** But the underlying calculations, were they in your  
24 rebuttal or introductory reports produced to the -- Epic?

25 **A.** I believe so, yes.

1 Q. Okay. Do you remember when Mr. Even said something to the  
2 effect of that Apple gets to charge 30 percent forever?

3 A. Yes.

4 Q. Has Apple made changes in its 30 percent commission since  
5 the App Store was opened in 2008?

6 A. Yes. They've lowered commissions in a number of  
7 circumstances, the small developer program, the various  
8 subscription -- the reduction for subscriptions, the reduction  
9 for video content. So they have lowered their commissions  
10 over time for certain kinds of content or certain kinds of  
11 developers.

12 Q. Do you remember, Professor Hitt, being asked about your  
13 *Fortnite* substitution analysis?

14 A. Yes.

15 MS. RICHMAN: Can we get slide 28, please.

16 BY MS. RICHMAN:

17 Q. And do you remember being asked about testimony in your  
18 deposition related to your conclusions on your *Fortnite*  
19 analysis?

20 A. Yes.

21 Q. In starting your *Fortnite* substitution analysis, did you  
22 start with a 64.5 percent retention rate?

23 A. No. That was what I was attempting to clarify.

24 As a theoretical matter, I'm not starting with that  
25 number. It turns out, though, that most of that spending

1 stays on the platform. So as an empirical matter, it is true,  
2 but there's nothing that forced it to be true ex ante.

3 Q. You were asked questions about growth in the market you  
4 study.

5 Is that consistent with your recollection?

6 A. Yes.

7 Q. And did you do an analysis of output in a but-for world  
8 that Epic has described?

9 A. I'm not sure that the but-for world is described cleanly  
10 by Epic, but I didn't do an alternative calculation in a  
11 but-for world because I don't think a clean version of that  
12 has been proposed.

13 Q. You did not think it was necessary in this case?

14 MR. EVEN: Objection, leading.

15 THE COURT: Sustained.

16 BY MS. RICHMAN:

17 Q. Did you think it was necessary in this case?

18 MR. EVEN: Objection, leading.

19 THE COURT: Sustained. So don't answer.

20 The question is why.

21 BY MS. RICHMAN:

22 Q. Professor Hitt, why did you not perform a but-for growth  
23 rate analysis in this case?

24 A. So for at least two reasons. One is I think the available  
25 data will support a comparison against the market as a whole.

1 I think that is a good and valid comparison. It is unclear  
2 what the specific but-for world is that is being articulated,  
3 so I didn't do it there.

4 There were also a number of questions -- Mr. Even asked me  
5 about why I didn't control for certain kinds of things. I  
6 think that's completely wrong. Moore's Law is not magic. It  
7 happens because developers and hardware engineers and Intel  
8 and Apple and Samsung and many other hardware manufacturers do  
9 the engineering to make that happen.

10 Same thing with the telcos, same thing with everybody who  
11 participates in the digital economy. Everybody's input is  
12 necessary to do so. Apple has invested enormous amounts to  
13 support their ecosystem. As a result, we can benefit from the  
14 continued improvements of these things.

15 So I do not think it's appropriate to remove that when  
16 thinking about how Apple chooses to monetize and operate a  
17 portion of the ecosystem that is fully integrated like iOS.

18 **BY MS. RICHMAN:**

19 **Q.** Were the iPhone improvements relevant to the analysis of  
20 competitive effects that you conducted in this case?

21 **A.** Yes, they are.

22 **Q.** And in what way?

23 **A.** So in many cases, the way Apple will respond is to -- is  
24 through innovation, to competitive effects. We have a number  
25 of documents indicating they identified, for example, some



1 kind of innovation by a competitor and would then evaluate and  
2 think about doing something themselves.

3 In addition, there is a very active competition in the  
4 smartphone devices themselves. And the continued innovation  
5 there is what makes it possible for certain kinds of  
6 technologies in games and products to be available and  
7 delivered through the iPhone. So I think for at least those  
8 two reasons, it is important to consider that.

9 **MS. RICHMAN:** Can we have slide 6, please.

10 **BY MS. RICHMAN:**

11 **Q.** Professor Hitt, did you use any benchmarks to gauge App  
12 Store growth?

13 **A.** Yes. I think this depicts one of them is that, you know,  
14 the simple observation that the game transactions of the App  
15 Store is growing six times as fast as the market as a whole.  
16 That is pretty strong evidence of expanding output.

17 **Q.** And did you see any evidence in your analysis that output  
18 would have been higher in a but-for world?

19 **A.** No. The -- so, for example, there is also the analysis  
20 where you look at just the overall app transactions when  
21 supposedly monopoly power was attained. The other thing is,  
22 keep in mind some of the numbers we are talking about here.  
23 We are talking about, you know, 1200, 2600 percent --

24 **THE COURT:** Slow down again.

25 **THE WITNESS:** We are talking about very large growth

1 numbers. And the argument would have to be that somehow that  
2 is not fast enough, that this dramatic change in these markets  
3 in terms of the expansion of volume of app transactions isn't  
4 enough.

5 I don't find any evidence of that to be the case. It is  
6 growing faster than the market as a whole, so I think it is  
7 reasonable to conclude -- at least there is no evidence that I  
8 have seen that would indicate it would be slower.

9 **BY MS. RICHMAN:**

10 **Q.** Did Dr. Evans conduct any empirical analysis on changes in  
11 output?

12 **A.** No.

13 **Q.** And he didn't -- did he offer any analysis of what output  
14 would have been in the but-for world?

15 **A.** I don't believe so, no.

16 **Q.** You were asked some questions about hypothetical  
17 monopolist test and SSNIP. Do you recall that?

18 **A.** Yes.

19 **Q.** Professor Hitt, why didn't you conduct a SSNIP test?

20 **MR. EVEN:** Objection.

21 **THE COURT:** Overruled. You raised that.

22 **THE WITNESS:** So for two reasons. One, as Professor  
23 Lafontaine had indicated, there are other methods that are  
24 commonly used for defining market boundaries; the one we used,  
25 which is substitution.

1 And, second, as Professor Schmalensee indicated, and is  
2 consistent with my understanding, in order to do those kinds  
3 of calculations in two-sided markets, even by the same methods  
4 that Dr. Evans has proposed, you need parameters and  
5 information that are just simply not available. And, in  
6 particular, you need to consider two-sided market effects. It  
7 is not clear you can do that. That is extremely difficult.  
8 And none of that was proposed here.

9 **BY MS. RICHMAN:**

10 **Q.** Did Dr. Evans conduct a valid SSNIP, in your opinion?

11 **A.** I evaluated only a couple of the empirical inputs to his  
12 SSNIP, and I don't believe they are appropriate for the uses  
13 he put them. I believe Professor Schmalensee and Professor  
14 Lafontaine addressed that and reached that conclusion, and  
15 there's nothing -- I -- I disagree with that.

16 **Q.** You were asked some questions about the small business  
17 program.

18 Do you recall that?

19 **A.** Yes.

20 **Q.** And the questions related to your characterization of that  
21 program as a price decrease. Is that consistent with your  
22 recollection?

23 **A.** That seems consistent, yes.

24 **Q.** What was the time period for the dataset that you used to  
25 calculate Apple's average commission?

1     **A.** It ends at the end of 2019. Producing 60 billion  
2     transactions in a dataset is kind of a challenging task, and  
3     so the data cuts off at the end of 2019.

4     **Q.** Does your analysis take into account any change in the  
5     average commission as a result of the small business program?

6     **A.** No. We would not have seen it in our data.

7     **Q.** Professor Hitt, you were asked about the Nintendo Switch  
8     substitution analysis. Do you recall that?

9     **A.** Yes.

10    **Q.** And I think there was a question about the number of  
11    individuals in -- implicated in your analysis. Do you  
12    remember that?

13    **A.** Yes.

14    **Q.** And what was that number?

15    **A.** I believe the number is approximately 457,000.

16    **Q.** And in your experience, is that a large population for a  
17    natural experiment?

18    **A.** Yes.

19           So, first of all, that's not all of the Switch adopters  
20    later, but I chose to focus on that because that would provide  
21    the cleanest test of the event -- of the introduction of the  
22    Switch. So that was deliberately chosen.

23           In that case, I was not trying to find all Switch users or  
24    do any calculations on that. I was trying to identify the  
25    population that would be most informative of the ability to, I

1 guess, switch upon the introduction of the Switch. So that is  
2 why that was chosen the way it was. 457,000 is a pretty big  
3 number.

4 Q. Thank you, Professor Hitt.

5 MS. RICHMAN: Pass the witness.

6 THE COURT: Recross limited to the scope of Redirect.  
7 I show five topics.

8 MR. EVEN: Thank you, Your Honor.

9 **RECROSS-EXAMINATION**

10 BY MR. EVEN:

11 Q. I believe you just explained to Ms. Richman that you  
12 believe that there are similar or comparable games that are on  
13 PC. Were those the words that you used?

14 A. Yes. That -- that look similar or comparable, yes. That  
15 was my understanding that my research team --

16 Q. I understand, sir. This was a point -- you remember that  
17 this is a two-sided market, correct?

18 A. Yes.

19 Q. And this was a point about the developer side, correct?

20 A. I think it is -- yes, it is about the developer side.

21 Q. And you understand that if somebody is playing *Fortnite* on  
22 the iOS and then goes out to play something called *Fortnit*  
23 that is really similar on a PC, that doesn't help Epic,  
24 correct?

25 A. I don't know if that is an actual example, but that would

1 seem to be correct, yes.

2 Q. So comparable games from a different developer, that's not  
3 something that moves or advances the ball for a developer who  
4 needs to pay the 30 percent to Apple, correct? They need  
5 their own game or their own store on PC in order to make this  
6 work, sir, correct?

7 A. I think for a particular developer, yes. But it does  
8 demonstrate the ability to offer these games in that format.

9 Q. Sir, we are not arguing here there are no games on PC,  
10 correct? Nobody is arguing that.

11 A. That's correct.

12 Q. You also mentioned emulators.

13 A. Yes.

14 Q. And an emulator is a piece of software that takes my PC  
15 and essentially turns it into an Android phone, correct?

16 A. I wouldn't characterize it that way. It allows you to,  
17 for example, run Android APK files, I believe, on a PC.

18 Q. Okay. Does Microsoft make an Android emulator?

19 A. I don't recall. I don't know.

20 Q. Does Apple make an Android emulator?

21 A. Again, I don't know.

22 Q. Does Citrix make an Android emulator?

23 A. I don't know.

24 Q. Does Adobe make an Android emulator?

25 A. Again, I don't know. I didn't research this.

1 Q. Does Google make an Android emulator for PCs?

2 A. Again, I don't know.

3 Q. Do you know who does make emulators?

4 A. No. I'm aware they are exist. I don't know who the  
5 developer is.

6 Q. So you need a piece of open software from the web that  
7 takes hold of your computer, a piece of middleware that runs  
8 on top of your PC, and then you can access these games from  
9 the Google Play store, correct? That's your testimony?  
10 That's the scenario you were thinking of about, about  
11 availability on PC?

12 A. No.

13 Q. I was just asking because I'm still a little -- I still  
14 remember the -- Apple's concern about the safety and security.  
15 So that would not be conducive to Apple sending people to the  
16 web to download emulators from the open web, correct?

17 A. No, that is not what I was hypothesizing. These are --  
18 for example, you can find on the Microsoft Store, download  
19 links to games that look like they're run on emulators.

20 Q. Okay. And by the way, when somebody is playing on an  
21 emulator, using an emulator, that means that the option that  
22 you are offering the developer is that the user will go out to  
23 a PC and download the game with an emulator from the Google  
24 Play store, right?

25 A. No. That is inconsistent with what I just said.

1 Q. That is what an emulator would be used for on a PC, right,  
2 to download games or other apps from the Google Play store?  
3 These are Android apps.

4 A. Separated into two things. Yes, that is something you can  
5 do. And, no, that is not what I was talking about.

6 Q. Okay. That would not be a good substitution for a  
7 developer, correct? The developer is already available on the  
8 Google Play store, right?

9 A. Yeah, that is not what I was hypothesizing.

10 Q. You said you did not look -- in your Switch analysis, you  
11 did not look to identify all Switch users, correct?

12 A. I didn't use all Switch users. They were not included for  
13 the reasons I gave.

14 Q. Okay. But you did identify the big group of Switch users  
15 on *Fortnite* who started the minute the game launched, correct?

16 A. Yes, in that month.

17 Q. Have you looked generally how many Switch users there are  
18 on *Fortnite*?

19 A. That data is available in my report. I haven't focused  
20 specifically on that in a while. You can derive that from  
21 some of the charts I have.

22 Q. Do you remember a ballpark?

23 A. I can look it up.

24 Q. Is it anywhere near 150 million, sir?

25 A. No.



1 Q. Because the truth is that while a lot of people have  
2 iPhones, not many people have the Switch, correct?

3 A. I wouldn't characterize it as not many. Certainly fewer;  
4 that's correct.

5 Q. By an order of magnitude fewer, correct?

6 A. I'd like to be precise to be more than that, but I think  
7 that is probably about right.

8 Q. I would like to bring up slide 6. And Ms. Richman asked  
9 you a couple of questions about that. And you were saying  
10 that this is -- the store is growing six times faster than  
11 U.S. consumer spending, right?

12 A. Yes, that's correct. It says what it says, which is the  
13 growth in the App Store over the comparable period is six  
14 times the figure reported here.

15 Q. That is because the world is moving to digital, correct?

16 A. Yes. The world -- we are a much more digital world.

17 Q. And you've not compared this, for instance, to any of the  
18 matrix I asked you, correct? You've not done a similar  
19 comparison, for instance, for the sale of phones or for the  
20 state of microprocessor, of the growth of cellular technology,  
21 or anything like that, correct?

22 A. I don't know if you did the sale of phones, but I have not  
23 attempted to control for that, for the reasons I described.

24 Q. I'm not asking now about control. I'm just asking when  
25 you put the comparison -- what you put before the Court is a

1 comparison between spending on the brand-new digital world  
2 versus spending in your local Office Depot. That is the  
3 comparison you are drawing here, right? You are not comparing  
4 the App Store to something that's high tech and growing?

5 **A.** So since you put the slide up, that is not the comparison  
6 being drawn here. I did mention the growth in GDP as a  
7 benchmark -- as another benchmark, yes. But you can also use  
8 the game transactions market as another benchmark.

9 **Q.** Sir, this comparison is to what matrix?

10 **A.** It is growth rate and digital games sales.

11 **Q.** Compared to?

12 **A.** That's the -- that's the digital game sales in the games  
13 transaction market as a whole relative to digital game sales  
14 on the App Store.

15 **Q.** That is a mature industry, correct?

16 **A.** I am not sure that has any meaning. This is an evolving  
17 industry. So -- and the entry of mobile, the entry of  
18 streaming all has occurred.

19 **Q.** Okay.

20 **MR. EVEN:** I think I have no more questions. Thank  
21 you.

22 **THE COURT:** Redirect limited to the Recross. I show  
23 three topics.

24 **MS. RICHMAN:** Thank you, Your Honor.  
25

**FURTHER REDIRECT EXAMINATION**

**BY MS. RICHMAN:**

**Q.** Just a couple of questions, Professor Hitt.

Are many of the games that Mr. Even mentioned -- that Mr. Even mentioned were not available on PC actually available for PC in the Microsoft store?

**A.** Yes. In many of the cases -- I don't know title by title, but in many of the cases that would fall under the categories identified by Mr. Even, they were available from the Microsoft store. And I think he showed one link that was.

**Q.** If a developer licenses a second developer to create a similar game on PCs, the first developer benefits from substitution; is that correct?

**A.** Sure. Gets their games on additional platforms, and that is a perfectly reasonable strategy.

**MS. RICHMAN:** Can we put up slide 6, please?

**BY MS. RICHMAN:**

**Q.** I think this eventually came out, but just for the sake of clarity, are you comparing spending in a local Office Depot to the App Store in this slide?

**A.** No. This is digital transactions.

**Q.** Digital transactions in -- what -- what is -- what are the parameters of that?

**A.** Literally digital transactions in games. There is a few different metrics of it, but this is the one identified that

1 are specific digital transactions. It omits, for example,  
2 physical sales.

3 **Q.** So this is digital game transactions. And what does the  
4 green arrow represent?

5 **A.** The green arrow is the increasing rate that -- cumulative  
6 growth rate -- total growth rate over that nine-year period is  
7 448 percent.

8 **Q.** And how does that compare to the growth rate in the -- of  
9 digital game transactions in the App Store?

10 **A.** It is one-sixth. To the extent you can compare growth  
11 rates like that, the App Store is growing six times faster.  
12 The digital games market itself is growing, nine, eight and a  
13 half times faster than the economy as a whole.

14 **Q.** What does that tell you about the competitive effects of  
15 Apple's conduct?

16 **A.** That there is nothing to suggest that they have engaged in  
17 anticompetitive conduct that has reduced output.

18 **MS. RICHMAN:** No further questions, Your Honor.

19 **THE COURT:** Any Recross on those topics?

20 **MR. EVEN:** No, Your Honor. Thank you.

21 **THE COURT:** Are you sure? The ping pong has stopped.

22 All right. Professor Hitt, you are excused, sir.

23 Next witness.

24 **THE WITNESS:** Thank you, Your Honor.

25 **THE COURT:** If counsel from each side will come up

1 and grab your binders.

2 **MS. FORREST:** Your Honor, while we are getting the  
3 next witness, I just wanted to -- since Ms. Richman had  
4 referred to certain case law relating to the issue of product  
5 market definition, I wanted to just similarly, if I could,  
6 while we are waiting for the witness to come in, suggest that  
7 the cases in paragraph 31 of our --

8 **THE COURT:** I'm not sure what you are talking about,  
9 Ms. Forrest. I didn't make a note about legal issues. I'm  
10 trying to focus on the factual issues.

11 **MS. FORREST:** I understand. Ms. Richman began her  
12 examination of Dr. Hitt with a recitation of certain cases.  
13 She referenced back to the product market definition. And I  
14 simply was just wanting to recite the Court to the cases in  
15 paragraph 31 of our Conclusions of Law. Those same cases  
16 would meet the ones cited by Ms. Richman.

17 **THE COURT:** Thank you. Who is the next witness?

18 **MR. EVEN:** Your Honor, Epic Games calls Dr. Michael  
19 Cragg.

20 **THE COURT:** Thank you.

21 **MR. EVEN:** I apologize, Your Honor. I just got a  
22 note about some sealing issues, so I would like to make some  
23 notes on my slides to make sure that I don't show anything I  
24 should not.

25

1 (MICHAEL CRAGG, called as a witness for the Plaintiff,  
2 having been duly sworn, testified as follows:)

3 THE WITNESS: Yes, I do.

4 THE CLERK: Please be seated. And then will you be  
5 sure that that microphone is underneath here or pointed  
6 underneath your shield.

7 THE WITNESS: Is that good?

8 THE CLERK: Please state your full name and spell  
9 your last name.

10 THE WITNESS: My name is Michael Cragg. My last name  
11 is spelled C-R-A-G-G.

12 THE COURT: Okay, sir. Good afternoon.

13 THE WITNESS: Hello.

14 THE COURT: And as soon as Mr. Even is settled, he  
15 will start his examination.

16 MR. EVEN: I apologize for that, Your Honor. Thank  
17 you for bearing with me.

18 **DIRECT EXAMINATION**

19 BY MR. EVEN:

20 Q. Good afternoon, Dr. Cragg.

21 A. Good afternoon.

22 Q. Dr. Cragg, did you submit written testimony in connection  
23 with this matter?

24 A. Yes.

25 MR. EVEN: Your Honor, may we approach?

1           **THE COURT:** You may.

2           **THE WITNESS:** Thank you.

3           **THE COURT:** Then I take it -- have they removed the  
4 binders? Maybe right after he's done. Did you get the  
5 binders, Mr. Niu?

6           **MR. NIU:** We will do that after.

7           **THE COURT:** You may proceed.

8           **MR. EVEN:** Thank you, Your Honor.

9           **BY MR. EVEN:**

10          **Q.** Dr. Cragg, is this a true and correct copy of your written  
11 testimony?

12          **A.** Yes.

13          **Q.** And does the testimony accurately summarize the opinions  
14 you reached in connection with this litigation?

15          **A.** Yes.

16          **Q.** Did you hear or review the testimony of Apple's experts?

17          **A.** I have.

18          **Q.** And did anything in their testimony cause you to change  
19 any of the opinions you expressed in this written portion of  
20 your testimony?

21          **A.** No.

22                 **MR. EVEN:** Your Honor, at this time, Epic moves to  
23 submit into evidence -- or admit into evidence Dr. Cragg's  
24 written testimony.

25                 **THE COURT:** Okay. So provisionally admitted once you

1 all let me know that all the sealing issues have been  
2 resolved. Proceed.

3 **MR. EVEN:** Thank you, Your Honor.

4 **BY MR. EVEN:**

5 **Q.** If we can, Dr. Cragg, if you can look at the screen or at  
6 the slides in your binder, whichever is more convenient for  
7 you. Put up slide number 1.

8 Is this a summary of your background and experience?

9 **A.** Yes, it is.

10 **Q.** Can you please summarize your educational background?

11 **A.** I have a Ph.D. in economics from Stanford and a master's  
12 degree in economics from the University of British Columbia  
13 and a bachelor's of engineering from Princeton.

14 **Q.** When did you receive your Ph.D. in economics?

15 **A.** In 1993.

16 **Q.** And have you ever taught economics?

17 **A.** Yes.

18 **Q.** Where did you teach?

19 **A.** I taught at Colombia and at U.C.L.A.

20 **Q.** And what is your current employment?

21 **A.** I'm currently a principal at The Brattle Group.

22 **Q.** And what's The Brattle Group?

23 **A.** The Brattle Group is an international economic consulting  
24 firm.

25 **Q.** And at a high level, can you describe for me your work at



1 The Brattle Group?

2 **A.** Certainly. It is similar to what I was doing as an  
3 academic, where we do research on complex economic and  
4 financial topics for clients.

5 **Q.** How long have you been a consultant on economics?

6 **A.** About 25 years.

7 **Q.** And what is the focus area of your consulting work?

8 **A.** There are two areas that I focus on. One is industrial  
9 organization, and the other is in corporate finance.

10 **MR. EVEN:** Your Honor, at this time, Epic tenders Dr.  
11 Michael Cragg as an expert in industrial organization  
12 competition.

13 **MR. SWANSON:** Dan Swanson, Your Honor, for Apple. No  
14 objection.

15 **THE COURT:** It's admitted.

16 **BY MR. EVEN:**

17 **Q.** Dr. Cragg, what was your assignment in this case?

18 **A.** I was given a broad assignment to review the expert  
19 reports of what I call the Apple experts, the Apple  
20 economists, which include Professor Lafontaine, Professor  
21 Schmalensee, Professor Rubinfeld, and Professor Hitt.

22 **Q.** And were you asked to focus on any specific areas within  
23 your analysis?

24 **A.** I did. There were two areas. One was on market  
25 definition and the other was on market power.

1 Q. And did you prepare a slide summarizing your opinions?

2 A. Yes.

3 Q. Let's turn to that slide. And can you provide -- without  
4 reading, just state what, at a high level, are your opinions  
5 in this case?

6 A. Sure. There are two opinions that relate to the topics  
7 that we just discussed. One is on market definition. I  
8 concluded that the Apple experts' market definition is both  
9 too broad and too narrow at the same time. And that, second,  
10 related to the other aspect of my assignment, I concluded that  
11 Apple has significant market power.

12 Q. So let's begin with your opinions regarding market  
13 definition.

14 Is there a test that, in your view, the Apple experts  
15 could have performed to determine whether game app  
16 transactions on the App Stores should be analyzed separately  
17 from nongame transactions?

18 A. Yes. The standard test is the hypothetical monopolist  
19 test.

20 Q. How would that test work to make that determination in  
21 this case?

22 A. Well, in this case, the Apple experts start with a market  
23 definition that considers game transactions, digital game  
24 transactions on iOS. And then the question for them is, is  
25 there a larger market, and that's where the hypothetical

1 monopolist test comes into play.

2 **Q.** And so how would you do that to try and distinguish  
3 between game transactions and nongame transactions?

4 **A.** Well, the way the test proceeds to answer that question  
5 is -- it's, you know, the hypothetical monopolist. So the  
6 starting point is to ask the question of if a monopolist were  
7 to monopolize the transactions market for games on iOS,  
8 would they be able to profitably raise price.

9 What I mean by "profitably raise price" is that there  
10 wouldn't be the effect of substituting away to alternative  
11 game stores, which could include a general purpose game store  
12 like the Apple App Store, or alternative specialty stores  
13 which were not specialty stores in game transactions.

14 **Q.** Are you talking about game -- sorry, about stores on iOS  
15 now?

16 **A.** Specifically stores on iOS, that is the starting point.  
17 And after that, you would look -- ask -- if you answered the  
18 question, no, then you would proceed by saying that, okay,  
19 there's a market for games on iOS. Now are there other  
20 substitutes for stores that provide game transactions on other  
21 platforms.

22 **Q.** So let's begin in the iOS. If there was a monopolist on  
23 game transactions on iOS and other stores that are not  
24 specialty stores on iOS, what would you think the  
25 hypothetical monopolist tests shows us?

1     **A.** There is no defining characteristic for game transactions  
2     from a store perspective, and so were that hypothetical  
3     monopolist to raise their distribution price, naturally  
4     publishers, namely game developers, would seek out an  
5     alternative store. For instance, the general purpose app  
6     store that we discussed a couple of minutes ago.

7     **Q.** So switching gears a little bit, the Court has heard a lot  
8     about substitution and what substitution means.

9             Have you done any analysis to determine substitutability  
10    between iOS transactions and transaction on other platforms?

11    **A.** Yes, I have.

12    **Q.** And were those data-driven?

13    **A.** Those are data-driven. I use a variety of techniques to  
14    examine that question.

15    **Q.** So did you prepare a slide summarizing those?

16    **A.** Yes.

17    **Q.** Let's put up the slide. And that is -- let's go through  
18    these one by one, if we may.

19             So let's begin with the first analysis, availability of  
20    game apps on each platform. Did you prepare summary slides of  
21    that analysis?

22    **A.** I did, yes.

23    **Q.** Let's bring up the next slide. If we can focus on the top  
24    please, Mr. Rudd.

25             So what are you showing in this first slide?

1     **A.** In this first -- in the first slide here, I have done  
2     research to identify the most popular games that are  
3     published, the lifetime of those games on each of the  
4     platforms that are posited by the Apple experts. So the  
5     portion of the table that has been expanded here is  
6     specifically for mobile games.

7     **Q.** Okay. Why did you --

8             **THE COURT:** You took the games from Professor Hitt?

9             **THE WITNESS:** No, I developed my own research for  
10    this.

11            **THE COURT:** Okay. I thought you said -- I  
12    misunderstood your testimony. Thank you for the  
13    clarification.

14            **THE WITNESS:** I am sorry.

15            **THE COURT:** Proceed.

16            **MR. EVEN:** Thank you, Your Honor.

17    **BY MR. EVEN:**

18    **Q.** And so looking at this list of games, let's start by, why  
19    are you highlighting *Fortnite*?

20    **A.** Well, *Fortnite*, as you can see on this fourth column,  
21    which shows the platforms on which the game is available, is  
22    in a unique position with respect to the other mobile games in  
23    that it is also uniquely available for play -- actually, for  
24    cross-platform play on a variety of different platforms. So  
25    it is in a different position than the vast majority of other

1 mobile games.

2 Q. And what did you find with respect to the nonmobile or  
3 static platforms?

4 And maybe if we can scroll down, Mr. Rudd. Thank you.

5 A. So I call these static platforms because for the most  
6 part, you have to -- to use their full functionality, you have  
7 to be in a location where you have internet connectivity as  
8 well as a power source. Obviously the Switch is somewhat  
9 mobile, but it doesn't have that internet -- it doesn't have  
10 cellular capacity.

11 Q. When you look platform by platform, one of the facts that  
12 is evident is that for the static platforms, you don't see  
13 that they also are publishing games on mobile devices.

14 THE COURT: Did you do -- with respect to Switch, did  
15 you do an analysis for Switch, both mobile and static, or you  
16 just assumed static and never addressed the mobile issue?

17 THE WITNESS: I assumed that the Switch would be  
18 either played on the screen that comes with the Switch or that  
19 it would be played on a screen in the household, for instance.  
20 I didn't look at the difference between those two.

21 THE COURT: So you never did an analysis including  
22 Switch in the mobile context?

23 THE WITNESS: I did look at Switch to see whether it  
24 appears in that top 30 -- the list of top 30 games. And vice  
25 versa; do the mobile games appear on the list of games for

1 Switch. And the crossover there is very limited.

2 **THE COURT:** All right. Proceed.

3 **BY MR. EVEN:**

4 **Q.** Maybe let me try and clarify one thing here, Dr. Cragg.

5 If you know, are games for Switch different for the  
6 mobile -- or portable, I should say, really, game play mode  
7 versus the static play game mode or is it just that the device  
8 changes and the game is the same?

9 **A.** My understanding is that the device stays the same. You  
10 can augment the equipment, the ancillaries that are with it,  
11 but the game functions in both a mobile and what I'm calling a  
12 static capacity.

13 And the other aspect which is different is that the Switch  
14 is primarily looking to capitalize on Nintendo's catalog where  
15 you have some very old, well-known, well-branded franchises  
16 like *Mario Cart* and so on. And it is looking to capitalize on  
17 that and it doesn't, as a company, look to do so on mobile  
18 devices, for instance, or other platforms.

19 **Q.** Okay. Thank you.

20 Based on this slide we've just looked at of most popular  
21 games and how many of these games are available where, what  
22 does this tell you about the availability and substitutability  
23 between these platforms?

24 **A.** So there are two conclusions that I draw from this. One  
25 is that for mobile games, we see that all games are published

1 on both Android and iOS, and they are published, in my view,  
2 because that's the way a developer is going to access those  
3 different populations.

4 So there isn't a substitution between those games from the  
5 consumer's perspective. Rather, the developer has to go  
6 through these two channels to be able to reach each of these  
7 different populations.

8 For the static games, the nature of those games is quite a  
9 bit different than on a mobile device. The static games are  
10 more complex. They take advantage of the fact that you have a  
11 bigger screen, you have different ways of interacting with the  
12 game. And as a result, those games provide a different  
13 experience which is differentiated in a substantial way from  
14 the mobile devices. So from that perspective, a platform does  
15 not -- platform games do not act as a substitute for mobile  
16 games. They are just different experiences for the consumer.

17 **Q.** Just a quick question. You mentioned that they're more  
18 complex.

19 Have you done any research as part of your analysis in  
20 this case into the relative budget for making a mobile game  
21 versus a console game?

22 **A.** Yes.

23 **Q.** And what is the difference between those?

24 **A.** They are very much like producing a movie. They are big  
25 budgets. For a console, it's -- can be upwards of a couple



1 hundred million to produce a game --

2 **THE COURT:** Where is that data?

3 **THE WITNESS:** That is in my written direct, Your  
4 Honor.

5 **THE COURT:** But I take it you have data --

6 **THE WITNESS:** Yes.

7 **THE COURT:** -- for that proposition?

8 **THE WITNESS:** Yes, I do.

9 **THE COURT:** You got that from the manufacturers, the  
10 producers?

11 **THE WITNESS:** Not from the manufacturers or  
12 producers, but from the press, and the gaming industry has a  
13 variety of consulting companies and other research  
14 organizations that focus on providing information to game  
15 developers. And they provide advice for those who are  
16 thinking of doing a mobile game, developing a mobile game and  
17 contrasting that with what goes into developing a -- the  
18 phrase that they -- the way they refer to static games are HD  
19 games, getting across that these are, you know, full-on  
20 absorbing entertaining experiences, and that's expensive to  
21 produce.

22 **THE COURT:** Proceed.

23 **MR. EVEN:** Thank you, Your Honor.

24 **BY MR. EVEN:**

25 **Q.** I am sorry, I'm not sure you finished your thought there,

1 Dr. Cragg. So you explained that console games are like big  
2 blockbuster movies, a couple of hundred million, I think you  
3 said.

4 **A.** Yes.

5 **Q.** But I don't think you finished the thought about the  
6 comparable or comparative cost of mobile games.

7 **A.** Well, the comparative cost for mobile games is hundreds of  
8 thousands of dollars and -- or less. The games that are being  
9 produced for the most part for mobile devices are simpler.  
10 They are playing -- they are played on a much simpler -- the  
11 experience has to be limited because of the size of the  
12 screen. And, second, the use of a mobile device tends to be  
13 at a time when you're not looking to be absorbed in that  
14 entertainment; but, rather, it's fleeting in experience.

15 **Q.** Okay. So let's dive a little bit more into the data and  
16 let's look at the next slide which talks about usage. And I  
17 think you mentioned in your summary that you looked at both  
18 spending and play time. And let's start with the first column  
19 because there are -- there's a lot of data on slide. What do  
20 we see in the first column?

21 **A.** The first column, this is for *Fortnite* players, so this is  
22 taken from the *Fortnite* dataset that was provided in  
23 discovery. The first -- I've taken that data and segmented it  
24 into rows that correspond to the platform where *Fortnite* is  
25 being played.

1 Q. And what do we see from the first column about average  
2 minutes per week that is relevant to your analysis?

3 A. Well, this is a -- the statistic here shows that the  
4 average minutes per week that are played by someone on a  
5 mobile device is typically less than an hour. Whereas, those  
6 who are playing it on PlayStation 4 or an Xbox or the Switch  
7 are doing so in a much more absorbed way where it is several  
8 times -- you know, six, seven hours of play on average for  
9 those who are playing *Fortnite* on consoles.

10 Q. And what does this first column tell you about  
11 substitutability between these different platforms?

12 A. Well, it demonstrates that these -- *Fortnite* is being  
13 played in different ways on these platforms. Therefore, the  
14 platforms, from a consumer perspective, don't act as  
15 substitutes for each other because the game play is done in a  
16 different way.

17 Q. All right. So let's now look at the second and third  
18 columns which you put a headline there by primary platform and  
19 you talk about players thousands and average revenue. Can you  
20 explain what you see there that's relevant to your analysis?

21 A. So the column labeled "Players" just tell us how many  
22 players play iOS, almost a couple million. And then the  
23 column that is titled "Average Revenue" is the amount that is  
24 spent on average for -- on each of these devices.

25 Q. And what can you tell us about the trends that we see

1 that iOS is a lot of players, but relatively small revenue  
2 versus some of the consoles?

3 **A.** Well, the lines, which is what I was just saying, is that  
4 console players are more engaged in their play with *Fortnite*  
5 and they spend more. So it corresponds to, you know, the idea  
6 that the play on these devices is being done in a way that  
7 doesn't support there being substitutes for each other.

8 **Q.** Okay. So we're going to get our two-minute warning.  
9 Let's try and do columns --

10 **THE COURT:** Three minutes.

11 **MR. EVEN:** Three minutes. Thank you, Your Honor.

12 **BY MR. EVEN:**

13 **Q.** We can leisurely do columns 4 and 5, Dr. Cragg. What do  
14 you show there about multiplatform users?

15 **A.** This last group is a different set of players. I'm  
16 looking at players that use multiple platforms to play. And  
17 what we see in the fourth column, which corresponds to the  
18 number of weeks that the platform was not used, is that  
19 there's a substantial difference between the PlayStation and  
20 Xbox consoles, for instance, and iOS.

21 So for iOS, four out of five weeks, the platform wasn't  
22 played, and only one -- the last column here, the 10 percent,  
23 corresponds to one out of ten weeks, it was the most played  
24 platform. So for these multiplatform players, they are not  
25 really playing on iOS in the same way, by a long shot, as

1 those who play on a console.

2 **THE COURT:** And what was the time period? A year?  
3 Or what were you doing, percentage of weeks?

4 **THE WITNESS:** This would be the -- from the time that  
5 I observed them going from a -- playing on a single device to  
6 playing on multiple devices --

7 **THE COURT:** What is the time period?

8 **THE WITNESS:** The time period looking forward from  
9 that trigger.

10 **THE COURT:** What was the time period?

11 **THE WITNESS:** Oh. It is from the start of *Fortnite*  
12 through to the beginning of last year.

13 **THE COURT:** So to January 2020?

14 **THE WITNESS:** Yes.

15 **THE COURT:** Go ahead.

16 **MR. EVEN:** So by my watch, I have ten seconds, Your  
17 Honor, and I'm moving to a new slide. Maybe this is a good  
18 time to break.

19 **THE COURT:** All right. Good enough. We will stand  
20 in recess for 40 minutes. We will be back on the record at  
21 1:15. Thank you.

22 **MR. EVEN:** Thank you, Your Honor.

23 (Recess taken at 12:35 p.m.)

24 (proceedings resumed at 1:15 P.M.)

25 **THE CLERK:** Remain seated. Court is in session.

1 Come to order.

2 **THE COURT:** Okay. We are back on the record.

3 The record will reflect that the parties are present.

4 Mr. Cragg is on the stand.

5 Ms. Forrest is standing so -- as opposed to Mr. Even.

6 Yes, ma'am.

7 **MS. FORREST:** Yes, very briefly, Your Honor.

8 Mr. Doren and I conferred during the lunch break, and he  
9 has, subject to the Court's decision on this, graciously  
10 agreed that from the Apple perspective they would not be  
11 opposed if we were able to break after Mr. Cragg is off the  
12 stand, which we don't expect to be before 2:45, between the --  
13 Mr. Even's examination and the examination of Apple, to allow  
14 us to prepare for the next witness which will be Mr. --  
15 Dr. Evans.

16 We're trying very -- we're scrambling to get the right  
17 people in place and the materials gathered. It has gone  
18 faster because of the events Your Honor is aware of and that  
19 we were hoping that that time would not count against us. And  
20 that is really the nature of the agreement that Apple had  
21 consented to if Your Honor is amenable.

22 **MR. DOREN:** That's right, Your Honor.

23 **THE COURT:** Okay.

24 Well, given the extraordinary circumstance, which I'm  
25 assuming we'll deal with that later, I am agreeable.

1           It does -- we do have court issues and so that I am very  
2           cognizant about trying to get you all done during the allotted  
3           time.

4           So towards the end of this trial, we will have a jury in  
5           the building. We'll be down court reporters. So it is  
6           important that we try to stick with the schedule that I've  
7           laid out.

8           **MS. FORREST:** Understood, Your Honor. Thank you very  
9           much.

10          **THE COURT:** All right.

11          **MR. DOREN:** Thank you, Your Honor.

12          **THE COURT:** Okay. Mr. Even, you may proceed.

13          **MR. EVEN:** Thank you, Your Honor.

14          **Q.** Dr. Cragg, we were talking about your deep dive into the  
15          data about usage and spending, and I think we're just about  
16          done with that.

17          So why don't we move on to the next analysis and data cut  
18          that you took, and that's Slide 6.

19          **MR. EVEN:** If we can put that up, please.

20                       (Demonstrative published.)

21          **BY MR. EVEN:**

22          **Q.** And what does this chart show us, Dr. Cragg?

23          **A.** Well, Slide 6 is another way to look at a summary of how  
24          users play Fortnite. And so what I've looked at is, for each  
25          month, how many users use one platform or two platforms or

1 more.

2 And -- and then I have graphed that information.

3 **Q.** So what are the big blue mountains that we see towering  
4 over this slide?

5 **A.** Well, these are users who play on a single platform. And  
6 so if you contrast the -- the navy line there with the teal  
7 one where -- which corresponds to Fortnite users who play on  
8 two platforms, you can see that there's an eightfold or more  
9 difference in the -- in those populations.

10 **Q.** And what, if anything, were you able to conclude from this  
11 analysis regarding player multi-homing?

12 **A.** Well, from a multi-homing perspective, on a month-by-month  
13 basis, players don't really do that. It's -- people play on a  
14 single platform for the most part.

15 **Q.** And what does that show you about people's willingness to  
16 substitute?

17 **A.** Well, the -- you know, the hypothesis of the Apple experts  
18 is that multi-platform play, a -- you know, doing transactions  
19 across platforms is a way of, you know, creating a  
20 disciplining force for the Apple App Store. And from a  
21 practical perspective, that's just not happening in this  
22 marketplace.

23 **Q.** And this is obviously play time, as you explained. How  
24 can you deduce where people transact from where people play?

25 **A.** Well, to play, you sign on to a -- a device. So you log



1 in to Fortnite. And so what we're seeing in this graph is  
2 that the vast majority of people sign in to Fortnite on a  
3 single device each month.

4 And so that says that they're not transacting across  
5 platforms, the majority of people, but rather they're -- if  
6 they're going to transact, it's going to be on the one -- you  
7 know, the platform that they're on.

8 **THE COURT:** So doesn't that also suggest that if  
9 you're a single -- in terms of substitution, that a Fortnite  
10 user, from a consumer's perspective, the consumer would use  
11 the same platform for some other game if they wanted to game?

12 **THE WITNESS:** Yes. That would -- you know, depending  
13 on whether they own more than one platform, that would be  
14 true.

15 **THE COURT:** Okay. Keep going, Mr. Even.

16 **MR. EVEN:** Thank you, Your Honor.

17 **Q.** Let's talk about the regression models that you discussed  
18 in your summary slide. And maybe as a first step, can you  
19 explain at a high level what a regression model does?

20 **A.** Well, a regression model is the workhorse of economic  
21 research, and it looks at the relationship between two  
22 variables holding constant the effects of other things.

23 And so as an example, for instance, from earlier today  
24 Professor Hitt had spoken about -- in looking at the Switch,  
25 there's a need to, you know, if you can, hold constant the

1 release date, for instance, of new updates. And so a  
2 regression framework, which I've used, allows for controlling  
3 that -- for those types of events.

4 Q. Okay. So what did you look at in your first regression?

5 A. So I was interested in what is the impact of starting to  
6 play on a -- an alternative device on how somebody experienced  
7 Fortnite overall. And so the first regression examines that  
8 question of introduce another platform, what happens to total  
9 play time.

10 Q. Okay. So let's turn to the next slide.

11 (Demonstrative published.)

12 BY MR. EVEN:

13 Q. And let's take this one by one.

14 So first of all, we see original platform at the top. And  
15 user adds a second platform on the left. What does that mean?

16 A. So across the top, if you -- let's take the top left entry  
17 here, if your original platform was a mobile device, the rows  
18 correspond to people who, you know, started playing on a  
19 second mobile device or started playing on a Switch or a home  
20 console or a PC. So that's how the analysis is -- is focused.

21 Q. Okay. And so let's try and -- and see if we understand  
22 what -- what are the plus marks, for instance, when you start  
23 with a original platform mobile device, and I see four pluses  
24 below it when the second device is either mobile, Switch,  
25 home-owned console? What do these pluses convey?

1     **A.** So this is a summary of a bunch of coefficient estimates  
2     which have the estimate and the standard deviation. So that's  
3     kind of what the output looks like. Then consolidated that  
4     and used the plus sign to indicate when there was a  
5     statistically significant increase in total play on both the  
6     original platform as well as the second platform.

7             And so that's what the plus indicates is an increase in  
8     total play when you start using a second device.

9     **Q.** If you go from your first device to the second device and  
10    substitute play from one to the other, what would you expect  
11    to see in terms of play time?

12    **A.** You'd expect that play time would, you know, stay roughly  
13    the same.

14    **Q.** And what are we seeing here when the original platform was  
15    mobile device and then whatever other platform was added?

16    **A.** So for mobile devices, for every single platform type that  
17    was introduced as a -- as a new place of play, we see an  
18    increase in total play.

19    **Q.** And what happened when the mobile device was the -- the  
20    second platform, so if somebody played on something else and  
21    then added a mobile device?

22    **A.** And so conversely, the same pattern holds that if you were  
23    playing on a Switch, for instance, and you started playing on  
24    a mobile device as well, your total play time increased.

25    **Q.** And so that additional -- that play would be incremental?

1     **A.** It's incremental, exactly.

2     **Q.** Okay. What are the double dashes that we see here, for  
3 instance, from one home console to another?

4     **A.** Yeah, that's -- the double dash indicates that there was  
5 no statistically significant change in play. So there isn't  
6 a -- a meaningful change from introducing a second platform.

7     **Q.** Okay. And would that be -- would that be consistent with  
8 substitution between the two platforms?

9     **A.** It is. So when you, for instance, introduce a -- a home  
10 console, what we see when someone starts playing on a second  
11 home console, which is a very similar type of experience in  
12 contrast to a mobile device, we don't see a -- the -- the same  
13 increase in total play that we did with a mobile device.

14     **Q.** Okay. What did you do next in term of your regression  
15 analysis?

16     **A.** Well, I was curious about the claim of the Apple experts,  
17 and I looked directly at testing whether there was this  
18 substitution effect.

19             And this is a particularly important case to look like --  
20 look at because if there are any games where that hypothesis  
21 would have held true, it would have been in the case of  
22 Fortnite. It's one of these unique platforms where there's  
23 this possibility of switching between platforms of the -- of  
24 the type that the Apple experts posited for why they should be  
25 in the same market.

1           If it's not true for this particular case study, which is  
2           the best case study that, you know, if -- would be, you know,  
3           the -- the most likely place you'd find this substitution, if  
4           it doesn't hold true for this, it's unlikely to hold true for  
5           the other games where the same type of play opportunity  
6           doesn't exist.

7           **Q.** Okay. And specifically what did you look at in terms of  
8           your second regression?

9           **A.** So the second regression is very similar in structure  
10          except that I looked at what happened to total play on the  
11          original platform when you introduce a second platform. And  
12          so --

13          **Q.** I see.

14          **A.** -- this is analogous to kind of the closest thing that  
15          we're going to get to the type of price change that, you know,  
16          Professor Schmalensee discussed the other day.

17          **Q.** Okay. So let's go to the next slide and look at the  
18          results of that particular regression.

19                               (Demonstrative published.)

20          **BY MR. EVEN:**

21          **Q.** And let's first of all make sure we understand the  
22          presentation.

23               And so here, for instance, I see that we have the same  
24          original device and second platform -- original platform,  
25          second platform structure as in the prior one, correct?

1       **A.**   Yes.

2       **Q.**   And then in mobile device, for instance, I see that you  
3       say okay for mobile device and I add another mobile device, it  
4       says C.

5           What does C stand for?

6       **A.**   So C is shorthand for, you know, complementary.

7       Complementary in the sense that when you start playing on a  
8       second mobile device, your play on the original mobile device  
9       actually goes up. And so there's a feedback between the two  
10      where your -- you know, you've enhanced the experience on the  
11      original device so it's not -- you don't substitute away to,  
12      you know, playing on a new mobile device. Instead you play on  
13      both of them more vigorously.

14           So if you, for instance, add an -- an iPad to somebody who  
15      had an iOS, they engaged in both on a -- on a more vigorous  
16      basis.

17      **Q.**   Okay. So I see the C for mobile -- when the first one is  
18      mobile device and I add a -- another mobile device, and that's  
19      along the lines of what you described. I also see it for  
20      mobile device to PC.

21           But then in the middle, I see for mobile device to Switch  
22      or to home console, and I see the double dashes. What does  
23      that mean?

24      **A.**   So the double dash indicates that there is not a  
25      significantly significant decline in play on the mobile device

1 when you introduce a Switch. So they're not substituting for  
2 each other in the way that, you know, could have been, you  
3 know, in the way that's posited by the Apple experts.

4 **Q.** I see. And so for this one essentially, if I understand  
5 you correctly, what you're saying is if I started on the  
6 mobile device and then I added the Switch, the Switch will be  
7 incremental, but I keep playing on the mobile device just as I  
8 had before.

9 **A.** Exactly.

10 **Q.** Okay. And then I also see some S's between Switch and  
11 home console, for instance. What does -- what does the  
12 S stand for?

13 **A.** Well, the S stands for a substitution effect where the  
14 play on the original device goes down. And so for the static  
15 devices, Switch, home console, and PC, when you introduce a  
16 different static device, namely a gaming console, for each of  
17 those original platforms we see a decline in their play.

18 **Q.** Okay. And what does all this tell you based on this  
19 regression about substitutability between these platforms?

20 **A.** Well, I think the most important piece is that other  
21 platforms don't act as a substitute for iOS on -- on Fortnite.

22 **Q.** So let's switch gears from your own data driven analysis  
23 into some of the things that you've done specifically to  
24 address some of the experts on the Apple side's work.

25 And let's start with Professor Hitt's console app

1 analysis. Did you hear some of Professor Hitt's testimony at  
2 least this morning?

3 **A.** I did, yes.

4 **Q.** And at a very high level, do you recall that Professor  
5 Hitt testified that he used some proxy to measure the changes  
6 between two groups in consumption of iOS games?

7 **A.** I did, yes.

8 **Q.** And I know in your written direct, you have some reference  
9 also or some thoughts about the proxy itself, but I want to  
10 focus today on his actual results.

11 In your view, do his results show the substitution that he  
12 posited?

13 **A.** No.

14 **Q.** And why not?

15 **A.** Well, he focuses on the -- on the growth rate, which for a  
16 study of consumption is not the typical way that an economist  
17 would -- would look. Instead, they are interested in how do  
18 the levels actually change in the way that, for instance, I  
19 had done in the regression analysis earlier.

20 **Q.** And can you explain why growth rates might lead to  
21 different results?

22 **A.** Well, it depends or can depend on the starting point. So,  
23 you know, if it's both populations start at the same level,  
24 it's -- you know, looking at the growth rate would be a direct  
25 measure that correlates with the change in levels.



1 But if the starting point is different and significantly  
2 different, you could draw, you know, a false inference.

3 **Q.** Can you give me a -- a very simplified numerical example  
4 of why you would draw the wrong inference?

5 **A.** Yeah. So let's consider a simple example that each  
6 population's consumption went up a dollar from over the time  
7 period of interest here.

8 **THE COURT:** But before you do that, your consumption  
9 is playing time, not dollars.

10 **THE WITNESS:** No, now I'm looking at dollars. So  
11 we've left the Fortnite data and we're now looking at the  
12 Apple iOS transaction data that Professor Hitt looked at.

13 **THE COURT:** Okay. Go ahead.

14 I'm sorry. You can start repeating.

15 **MR. EVEN:** That's okay. Thank you, Your Honor.

16 **Q.** So you were, I think, trying to explain an example, a  
17 simplified numerical example of why looking at growth rate  
18 might give someone the wrong impression about what actually  
19 happens with the underlying numbers.

20 **A.** Right. So imagine the year-over-year change for Professor  
21 Hitt's populations were a dollar. So they're the same for the  
22 download group as well as the non-download group. So you say  
23 there's no change that -- across, you know, no difference  
24 across the two populations.

25 But suppose the group that didn't download started

1 originally in 2017 at a dollar and the other group started at  
2 \$10. So the console players were already spending more.

3 In that case, the dollar-over-dollar change, a hundred  
4 percent increase would be what you would observe for the --  
5 for the nontreatment group. And then the treatment group,  
6 which, you know, download the console app, you'd have a dollar  
7 on 10-dollar increase, and so it'd only be a 10 -- a  
8 10 percent increase.

9 So a hundred percent increase for the non-download group,  
10 a 10 percent increase for the download group, you know, that's  
11 where you end up having the wrong inference because, in fact,  
12 they both had the same change in year-over-year consumption.

13 **Q.** Okay. And did you represent the data that was used by  
14 Professor Hitt to see whether the focus on growth rate caused  
15 some misperception here?

16 **A.** Yes, I did.

17 **Q.** And so if you open your binder, this is one that I believe  
18 we cannot put up on the screen subject to a motion to seal.

19 But at a high level, without speaking to the specific  
20 numbers --

21 **THE COURT:** Which slide?

22 **MR. EVEN:** This is Slide 9, Your Honor.

23 **THE COURT:** Okay.

24 **BY MR. EVEN:**

25 **Q.** And so Slide 9, I believe, is Professor Hitt's growth

1 rate, correct?

2 **A.** Yes.

3 **Q.** And --

4 **A.** So --

5 **Q.** -- he reports 24 percent for one group, the blue group,  
6 and 19 percent to the -- for the other group?

7 **A.** That's right. The -- the group that downloaded the app,  
8 he views that as a decline in their consumption.

9 **Q.** Okay.

10 And now, without mentioning the dollar numbers, because I  
11 believe those are subject to that seal motion -- sealing  
12 motion, if you turn to Slide 10, what happens if we look at  
13 the actual dollar numbers?

14 **A.** So the actual dollar number shows that the group that did  
15 download the app actually bought more in 2019 than the group  
16 that didn't. And so it's not the \$1/\$1 example that I gave  
17 earlier. It's \$1 and a larger amount for the group that  
18 downloaded the app.

19 So it reverses the conclusion that Professor Hitt would  
20 make from this analysis.

21 **Q.** Okay. And have you drilled down to look at the actual  
22 numbers of change?

23 **A.** Yes.

24 **Q.** So if we look at the next slide. And again, don't speak  
25 to the actual numbers. But is what you see this difference in

1 starting point that you described?

2 **A.** Exactly. That's the cause of the incorrect inference that  
3 Professor Hitt makes that the control group, just like in my  
4 example, was spending more -- spending less in 2017 than the  
5 console download group was in 2017. So the console group was  
6 spending more.

7 And then in 2019, after the treatment effect, they spent  
8 even more relative to the control group.

9 **Q.** And just so we make sure we understand, when you say  
10 the -- the console group, that is the -- the group that  
11 Professor Hitt, assuming his proxy worked, identified as  
12 people who started playing more on the console?

13 **A.** Yes, that they -- the -- the hypothesis is that by  
14 downloading the app in 2018, he can infer that that group also  
15 was playing games on iOS.

16 **Q.** Okay.

17 And you see that that group actually spent more than the  
18 group who didn't, correct?

19 **A.** Yes.

20 **Q.** All right.

21 So let's turn to Professor Hitt -- Hitt's Nintendo Switch  
22 substitution analysis.

23 And here, if we look -- if we bring up Slide 12.

24 (Demonstrative published.)  
25

1 **BY MR. EVEN:**

2 **Q.** And that is the slide that we looked at this morning. And  
3 you weren't here, I believe, Dr. Cragg, but you've seen this  
4 slide before, correct?

5 **A.** I have, yes.

6 **Q.** And what is Professor Hitt describing in this slide?

7 **A.** Well, this is going -- now we're going back from the Apple  
8 data to the Fortnite data, so the data that we had examined  
9 before. And we're looking at a subset of that data. So the  
10 subset is the set of people who played on Fortnite in June of  
11 2018.

12 And -- and that's the -- that's the month that the Switch  
13 was released.

14 **Q.** And what is Professor Hitt's claim with respect to this  
15 data?

16 **A.** Well, with this -- and I'll just call this the manipulated  
17 data because it not the actual underlying data, it's data  
18 that's been manipulated -- he claims that the introduction of  
19 the Switch led to a substitution between iOS and -- and the  
20 Switch.

21 So we've already seen the regression results which are, I  
22 think, really the right way to examine this, but I'm following  
23 now Professor Hitt's methodology just to look at a high level  
24 at -- at his graph.

25 **Q.** And Professor Hitt explained to the Court today why it's

1 crucial in econometrics to index everything to a hundred  
2 percent here to get a correct comparison.

3 Do you agree with that?

4 **A.** No. I wouldn't describe this as an econometric analysis.  
5 This is really a fairly rudimentary review of numbers.  
6 Econometrics refers to analyses where you have standard  
7 errors, where you do regressions, that type of thing, and  
8 that's not what this is.

9 **Q.** And speaking to the indexing itself, what's wrong with  
10 indexing everything to a hundred here?

11 **A.** Well, indexing is similar to looking at growth rates.  
12 You -- you take all the data and, you know, make it equal in  
13 March of 2018, and then you, you know, express all the future  
14 data in relationship to that March 2018 starting point.

15 And so to the extent that March 2018 as a starting point  
16 is substantially different, this can lead to a real  
17 misinterpretation of the data.

18 **Q.** And did you take Professor Hitt's data for this analysis  
19 and re-present it in a different way?

20 **A.** That's right. I simply take the -- like I did before, I  
21 started with what was the actual -- what did the actual  
22 consumption data look like. And so that's what I did. That's  
23 kind of a first step to look at his analysis.

24 **Q.** And when you say actual consumption, what -- what is the  
25 matrix for consumption here?

1     **A.** Well, this is spending on iOS.

2     **Q.** Okay. So this is dollar value?

3     **A.** Dollar value.

4     **Q.** Okay. So let's take a look at the next slide, Slide 13.

5                     (Demonstrative published.)

6     **BY MR. EVEN:**

7     **Q.** And that are two charts that we see here?

8     **A.** Well, on the left is simply a reproduction of Professor  
9     Hitt's analysis where the -- the green line corresponds to iOS  
10    users that accessed Fortnite in June 2018 but excluding the  
11    Switch users.

12           And then the blue line is below it is the set of people  
13    who, you know, played -- accessed Fortnite on both iOS and  
14    Switch.

15    **Q.** And I see that the blue line is at the bottom on Professor  
16    Hitt's slide but at the top on your slide. Why is that?

17    **A.** Well, the reason for that is this indexing issue. So the  
18    people that accessed both -- accessed Fortnite on both iOS and  
19    Switch spent more on the game in March 2018 and that that  
20    pattern holds true all the way through the period.

21           So by the time that they start playing on the Switch in  
22    June of 2018, they're spending more than twice as much as the  
23    group that didn't start playing on the -- on the Switch.

24    **Q.** And why did you put these two red circles around the  
25    beginning in March 2018?

1     **A.** Because it shows that the starting point is substantially  
2     different. So for the group that doesn't play on the Switch  
3     in March 2018, they were spending, you know, on the order of,  
4     you know, between 25 cents and 50 cents; whereas the other  
5     group, the group that by 2018 -- by June were playing on the  
6     Switch, they were spending on the order of three times as  
7     much.

8             And so that's a very -- in this type of indexing exercise  
9     that starting point is a substantial difference.

10    **Q.** Okay.

11            In both of these -- in both of these analyses we just  
12    looked at, have you used any data other than Professor Hitt's  
13    data?

14    **A.** No.

15    **Q.** Okay. Did you also take a look at what actually happens  
16    in terms of spend on iOS in June of '18?

17    **A.** Well, we can see that in this graph. So for the -- the  
18    group that didn't buy a Switch, their spending increased from  
19    about \$1.75 to 2.25, so a 50-cent increase. Whereas those who  
20    started playing on the Switch saw an increase that was, you  
21    know, over a dollar. So a substantial difference in spending  
22    between the two groups. And the -- the Switch group spent  
23    even more than the non-Switch playing group.

24    **Q.** Okay.

25            So let's take a look at the next slide, that's Slide 14.



(Demonstrative published.)

**BY MR. EVEN:**

**Q.** And what are you showing here?

**A.** Well, here I'm again looking at the total spending for this population of iOS users in June of 2018 where they spend earlier in the year and then where they spend later in the year.

And so this is those people who started playing on the Switch in June. And we're looking at, well, what did they spend in the other months but, you know, immediately before and after this event.

**Q.** Okay.

And what are the two rectangles that are -- have sort of the yellow highlighting around them?

**A.** Well, that's -- that teal, again, is iOS users. So this is the spending by people who make Fortnite purchases on iOS. And you can see that there's an increase from June to July.

**Q.** And what happened with Switch? Where do we see the Switch use during that time?

**A.** Well, the Switch is the, you know, the fire engine red at the top. And in -- in June, they're spending about a million dollars on Fortnite purchases. And -- and this group then increases their -- their purchases on Fortnite as we go into July.

**Q.** Okay. So let's switch gears again and turn to a different

1 point from Professor Hitt.

2 And specifically I want to point -- turn to Slide 15.

3 (Demonstrative published.)

4 **BY MR. EVEN:**

5 **Q.** And this is reflecting Apple's opening Slide 47 and Hitt  
6 Figure 55.

7 And this says that the App Store's effective commission  
8 has decreased to 8.1 percent.

9 Do you see that?

10 **A.** I do see that, yes.

11 **Q.** And do you have an understanding as to how Professor Hitt  
12 calculated his effective gamed commission rate matrix?

13 **A.** Yes.

14 **Q.** And how did he go about doing that?

15 **A.** He averages together the commission on app downloads as  
16 well as IAP transactions. And then he averages it -- that in  
17 with those transactions where there's no commission rate  
18 charged either -- you know, it's an undefined number. He --  
19 he blends all of that together to generate the 8.1 percent.

20 **Q.** And what is the commission rate that he assigns or  
21 ascribes to free downloads?

22 **A.** Zero.

23 **Q.** And is that, in your view, a correct way of doing an  
24 average on a commission?

25 **A.** No. And there's a -- I think a -- you know, a reason for

1 that, which is ordinarily economists think of the following  
2 check, which is you should be able to multiply the revenue  
3 base times the average commission rate to get Apple's take. I  
4 mean that's -- that would be, you know, from an economist's  
5 perspective, the self-evident test.

6 You cannot do that with this effective commission rate.  
7 You can't go from Apple's -- the App Store total revenues,  
8 multiply it by this 8.1 percent to get Apple's return. It  
9 just doesn't compute.

10 **Q.** Okay.

11 So setting aside that -- that particular error, does the  
12 8.1 percent in and of itself show that commissions have  
13 decreased?

14 **A.** No. You need a change over time to make that statement.

15 **Q.** And did you do a time series analysis to determine how  
16 Professor Hitt's commission rate changed over time?

17 **A.** I did.

18 **Q.** And what methodology did you use to check for that?

19 **A.** I -- I replicated what Professor Hitt did. So independent  
20 of my critique of that, I simply took his method and applied  
21 it to the -- you know, the data over time to see what would  
22 happen, whether the statement at the top is actually  
23 consistent with the 8.1 percent.

24 Because it could easily have been the case that, you know,  
25 earlier on, the -- you know, the effective commission rate

1 could have been lower and so the statement would be correct  
2 even though data wasn't presented.

3 **Q.** Okay. So if you turn in your binder, because we have  
4 another slide that's subject to sealing, but if you turn in  
5 your binder to Slide 16.

6 And does that reflect the calculation that you did using  
7 Professor Hitt's methodology --

8 **A.** Yes, it does.

9 **Q.** -- over time? Sorry.

10 So what are you -- what are you showing the Court here in  
11 this slide?

12 **A.** Here, I'm simply replicating Professor Hitt's calculation  
13 for not only 2018 where you can see the 8.1 percent on the  
14 graph, but I've done that calculation for the other years from  
15 2008 through 2019.

16 **Q.** So setting aside your disagreement with Professor Hitt's  
17 calculation, what does this charge show you about Apple's  
18 claim that the commission rate has declined?

19 **A.** Well, it -- it's not right. Professor Hitt's calculation,  
20 his approach actually shows that the effective commission rate  
21 increases over time.

22 **Q.** Okay.

23 So now let's go to the next slide again in your binder.  
24 This is Slide 17.

25 And what is it that you're showing here under the heading

1 "Average Quarterly Commissions for IAP Have Increased"?

2 **A.** So here I'm looking at actual transaction cost on a -- a  
3 dollar basis. So on a transaction-by-transaction basis in IAP  
4 and then calculating what the average transaction cost was for  
5 each year.

6 **Q.** And that essentially asks how much money Apple gets to  
7 keep of every paid transaction?

8 **A.** Exactly.

9 **Q.** And what are you showing here?

10 **A.** Well, here I'm showing that the transaction cost increases  
11 over time --

12 **Q.** And --

13 **A.** -- for IAP.

14 **Q.** For IAP. Okay.

15 And you heard testimony today from Professor Hitt that he  
16 showed analyses that are very similar to this one, correct?

17 **A.** Yes.

18 **Q.** So he agrees with you that Apple's take per transaction,  
19 per IAP transaction, increased over time in terms of dollars,  
20 correct?

21 **A.** Yes. And that's -- that's also true for the initial  
22 download as well.

23 **Q.** Okay. And he said that that's great because that shows  
24 that -- that developers deliver value, correct?

25 **A.** Yes.

1 Q. Okay. And that's certainly great for Apple, correct?

2 A. Well, it is. They're providing the same service but  
3 getting more for it.

4 Q. Okay.

5 So with that, Dr. Cragg, I'd like to turn to the next  
6 slide.

7 THE COURT: By the same token, they provided that  
8 service for a game developer who chooses not to charge  
9 anything for free, right?

10 THE WITNESS: That's right.

11 THE COURT: So it's a business model decision.

12 THE WITNESS: It is.

13 BY MR. EVEN:

14 Q. Well, just so -- so we're clear about this, the -- the  
15 slide that you've shown does not look at original downloads,  
16 correct?

17 A. That's correct.

18 Q. This looks at in-app purchases happening after the -- the  
19 initial download.

20 A. Exactly. So for the game developers where this is the  
21 predominant form of transaction where they receive revenues  
22 through in-app purchases, there are no zero transactions in  
23 this graph.

24 THE COURT: Well, there are if -- so -- so what about  
25 the instance where -- well, I guess not. I mean because in

1     Fortnite, you can -- you can have purchases even -- you can  
2     have purchases if your wallet is full. And Apple gets  
3     nothing. How did you account for those, if at all?

4             **THE WITNESS:** I didn't. This is all of Apple's data.  
5     So it's not just the Fortnite data.

6             Of the overall that --

7             **THE COURT:** But that circumstance is not reflected in  
8     this chart. In-app purchases --

9             **THE WITNESS:** No, that's right. Exactly. So if you  
10    were in the Fortnite game playing -- accessing it through iOS  
11    and you had V-Bucks that you had bought somewhere else so  
12    you're transacting with -- within the Fortnite system, you  
13    would not be doing a transaction through -- through Apple at  
14    that stage.

15            **THE COURT:** Keep going.

16            **MR. EVEN:** Thank you, Your Honor.

17    **Q.** So, Dr. Cragg, turning to the last slide, you say Apple's  
18    market power is indisputable. What leads you to believe that?

19                   (Demonstrative published.)

20            **THE WITNESS:** Well, there really two things that --  
21    in my analysis that I've identified.

22            So, one, in a variety of different ways, you see  
23    increasing prices from -- from Apple, which is -- you know, is  
24    a direct measure of market power. As well I measured high and  
25    sustained margins by the App Store. And then there's this

1 absence of competitive pressure from other app stores because  
2 of the lack of substitution of transactions across platforms.

3 All of that together is a -- to me, a -- a, you know,  
4 strong evidence of there being monopoly power.

5 **Q.** Okay. So couple of last questions.

6 In his written testimony, Professor Hitt testified that  
7 developers can use websites for pay transactions with  
8 consumers even for in-game content that is used in an iOS app.

9 Do you agree with Professor Hitt that that's a reasonable  
10 substitute?

11 **A.** No.

12 **Q.** And have you seen any data going to that?

13 **A.** Yes.

14 **MR. SWANSON:** I'll object to this, Your Honor.

15 **MR. EVEN:** Your Honor --

16 **MR. SWANSON:** This goes to one of the issues about  
17 whether or not evidence is actually in the record. And I have  
18 every reason to believe that this is aiming toward a document  
19 that Spotify submitted to the Japan Fair Trade Commission that  
20 was not disclosed in Dr. Cragg's initial report, his rebuttal  
21 report, which has been included in his direct -- written  
22 direct which we object to both as undisclosed but also as  
23 hearsay document as to which we've had no opportunity to take  
24 discovery, it should not be relied upon and certainly not  
25 brought into evidence.



1           **THE COURT:** Okay. What paragraph are we dealing  
2 with, with the direct?

3           **MR. EVEN:** This is, I believe, paragraph 71, Your  
4 Honor, in the direct. But I'm working off of memory.  
5 Yes, 71, I'm told.

6           **MR. SWANSON:** That's -- that's the one.

7           **MR. EVEN:** And I believe Apple has moved against  
8 other parts and including parts relating to Spotify, I was  
9 actually going to ask to do this portion in closed session  
10 since we can't really discuss the document itself.

11           **THE COURT:** Okay. Let's -- let's go ahead, and I'll  
12 reserve on that one and we'll deal with it in a -- well, we'll  
13 deal with it later but not right this second.

14           Are you done? That was the last topic?

15           **MR. EVEN:** That's the last topic that I need the  
16 closed session for. So yes.

17           **THE COURT:** All right. Do you need -- are you  
18 otherwise finished with your direct?

19           **MR. EVEN:** I am otherwise finished.

20           **THE COURT:** Okay. Cross-examination.

21           **MR. EVEN:** Thank you Dr. Cragg.

22           Thank you, Your Honor.

23           **THE COURT:** Go ahead, Mr. Swanson. And make sure to  
24 identify yourself for the record when you come back.

25           **MR. SWANSON:** My welder's mask.

**CROSS-EXAMINATION**

**BY MR. SWANSON:**

**Q.** Dr. Cragg, good afternoon.

**A.** Good afternoon, Mr. Swanson.

**Q.** So, Dr. Cragg, you have held no academic position since 1998, right?

**A.** That's right.

**Q.** Okay. And you've never been a -- you've never held a tenured position at a university, correct?

**A.** That's right.

**Q.** You're a consultant, right?

**A.** That's what I've been doing for the last 25 years. I do some publications and some research, but the bulk of my professional life is serving clients.

**Q.** And you state in the C.V. you attached to your expert report that you've been qualified in federal court as an expert in antitrust, correct?

**A.** Yes.

**Q.** And -- and can you identify the federal court where you were qualified as an expert in antitrust by a federal judge?

**A.** It was in an administrative court.

**Q.** Was that an administrative law judge before the Drug Enforcement Agency?

**A.** I think that's the right -- I don't remember the exact venue, but it was to -- it was in a matter that involved

1 opiates, and so that -- that could have been the right venue.  
2 I just don't remember.

3 Q. That was a case before an ALJ regarding the application  
4 for registration by your client for importing raw opium; is  
5 that correct?

6 A. That's right.

7 Q. That was not an antitrust case, was it?

8 A. Issues of antitrust were at the -- some of the core  
9 principles that were at issue.

10 Q. That was not an antitrust case, was it, Dr. Cragg?

11 A. Oh, I see what you mean. It wasn't a, you know, a Sherman  
12 Act violation, a case about that.

13 Q. It was a case involving the Drug Enforcement Agency and  
14 opium importation, correct?

15 A. Yes. And the competitive relationships in that market.

16 Q. And that's the basis on which you represented in the  
17 report in this case that you were qualified in federal court  
18 as an expert in antitrust, correct?

19 A. Yes. I was using the phrase there as economists do to  
20 indicate the analysis of competitive conditions.

21 Q. You've never assisted the DOJ in an antitrust matter, have  
22 you?

23 A. I don't think I have.

24 Q. Have you looked at the resume that is available on The  
25 Brattle Group's website? We put in it front of you at your

1 deposition.

2 **A.** I remember you putting a -- a resume in front of me.

3 **Q.** Do you remember the resume states that you have assisted  
4 corporations, the FTC, and the U.S. Department of Justice in  
5 antitrust and IP matters; you recall that --

6 **A.** Yes.

7 **Q.** -- don't you?

8 That's not true, is it?

9 **A.** It is true.

10 **Q.** I just asked you in what matters have you assisted the  
11 U.S. Department of Justice that are antitrust matters.

12 **A.** Oh, I see. Yeah, with -- with respect to the DOJ, I don't  
13 think I've worked on a matter on behalf of the Justice  
14 Department.

15 **Q.** So that's not true.

16 **A.** Yes, if that's -- the "and" should not be there, I guess.

17 **Q.** And you were aware of that since the time I took your  
18 deposition, correct?

19 **A.** Yes.

20 **Q.** And you left it on your website, correct?

21 **A.** I don't manage my resume on the website.

22 **Q.** Aren't you the former chairman of The Brattle Group?

23 **A.** Yes.

24 **THE COURT:** Did you not ask someone to remove it?

25 **THE WITNESS:** I didn't. I haven't updated my resume

1 since I've -- I should say our marketing department is the one  
2 that updates resumes.

3 **THE COURT:** And I take it if you asked them to  
4 clarify and fix that, they would say yes, right?

5 **THE WITNESS:** Yes. I would assume they would.

6 **THE COURT:** So you'll do that today?

7 **THE WITNESS:** Yes.

8 **BY MR. SWANSON:**

9 **Q.** Dr. Cragg, you served as an expert in economics at a  
10 recent matter before the United States Tax Court, correct?

11 **A.** Yes.

12 **Q.** One of your principal areas of expertise is valuation,  
13 correct?

14 **A.** Yes.

15 **Q.** And in that matter, you were engaged on behalf of the  
16 Coca Cola Company?

17 **A.** That's right.

18 **Q.** And last November, the U.S. Tax Court issued a decision in  
19 the case where you were an expert, correct?

20 **A.** That's right.

21 **Q.** Do you recall that the court rejected your economic  
22 opinions?

23 **A.** I don't recall them not -- rejecting them. The court had  
24 to -- there -- there were substantially different perspectives  
25 of the two parties, and so the -- the court had to choose

1 between one set of analyses versus another set of analyses,  
2 and didn't adopt the approach that I was using.

3 Q. So you don't recall the court stating, "We perceive many  
4 deficiencies in Dr. Cragg's analysis"?

5 A. I do remember that.

6 Q. Okay.

7 And do you recall that the court found your economic  
8 opinions to be wholly unreliable?

9 A. I don't think that's how they described my opinions but  
10 rather a part of the analysis.

11 And as we had talked about in our -- in the deposition,  
12 given the choice that the court had to make in terms of how it  
13 was going to interpret Coca Cola's contracts, this would have  
14 to be a conclusion that it would draw about economic analysis.

15 Q. And -- and you don't recall the -- or do you recall the  
16 U.S. Tax Court finding that your methodology led to absurd  
17 results?

18 A. Yeah, I -- I do recall that, and that was referring to one  
19 of the specific calculations that related to one country out  
20 of all the countries that I had looked at.

21 Q. Now, Dr. Cragg, you were retained by Epic as a rebuttal  
22 expert in November or December last year, right?

23 A. I think that's the right time period.

24 Q. Okay. And you indicated earlier in response to Mr. Even's  
25 question that you followed the expert testimony in this case?

1       **A.**   Yes.

2       **Q.**   So have you been listening to any other testimony in the  
3       case or reading it?

4       **A.**   I have, yes.

5       **Q.**   Okay. Have you read -- well, what have you been doing?  
6       Listening?

7       **A.**   I read the transcripts from the first -- I think the first  
8       five days. And then from there on, I listened.

9       **Q.**   Okay.

10       Now, part of the expertise that you indicate you bring to  
11       this case comes from your study of platform economics  
12       including the American Express decision, correct?

13       **A.**   Yes.

14       **Q.**   You agree, don't you, that the Supreme Court set forth a  
15       reasonable definition of a transaction platform in *American*  
16       *Express*, right?

17       **A.**   I -- yes, the -- the way that they characterize what the  
18       transaction -- the relevant transaction in the *American*  
19       *Express* case and how you'd go about examining that  
20       marketplace, I thought was -- was reasonable.

21       **Q.**   Okay.

22       And you agree with Dr. Evans that the App Store is a  
23       two-sided transaction platform, right?

24       **A.**   Yes.

25       **Q.**   But you don't consider the iOS operating system to be a

1 distinct two-sided transaction platform, correct?

2 **A.** Yeah, there where I see the distinction coming in is that  
3 there's clearly transactions of the sort -- of the *American*  
4 *Express* sort happening in the App Store on iOS that's  
5 currently not the environment.

6 **Q.** Now, you agree that not all transactions provided by a  
7 transaction platform necessarily belong in the same product  
8 market, right?

9 **A.** Could you say that again, please?

10 **Q.** You agree that not all transactions provided by a  
11 transaction platform necessarily belong in the same product  
12 market, right?

13 **A.** Yes.

14 **Q.** Depends on the platform and the types of transaction at  
15 issue, correct?

16 **A.** Yes. The -- I think it -- it's hard to make a -- a  
17 sweeping statement about platforms because they're of all  
18 different types and structures.

19 **Q.** Now, you agree that the central economic question in  
20 defining a market is one of substitutability, correct?

21 **A.** Yes.

22 **Q.** And substitution is a matter of degree, right?

23 **A.** It is.

24 **Q.** Products in the same market don't need to be perfect  
25 substitutes, do they?



1     **A.** No. They have to impose price discipline on the other  
2 products in the marketplace.

3     **Q.** You would agree that products in the relevant market must  
4 be reasonably interchangeable?

5     **A.** From the -- it depends on what -- in a transaction market,  
6 there's a degree of -- there, the product there are  
7 transactions and from the store's percept -- perspective, they  
8 have to be reasonably interchangeable.

9     **Q.** Well, when there is a two-sided transaction platform  
10 market, you need to look at substitution by both sides of the  
11 market, right?

12     **A.** Not always.

13     **Q.** Well, is it necessary to take account of indirect network  
14 effects in a two-sided transaction platform market?

15     **A.** Yes, if there -- if those network effects exist, taking  
16 account of those, considering those, is important.

17     **Q.** Do you agree that with respect to transaction platforms,  
18 that network effects are pronounced?

19     **A.** As I say, not always.

20     **Q.** And that's an opinion that you and your consulting team  
21 sponsored in the *Sabre* case, right?

22     **A.** The expert I supported took that perspective.

23             And just to -- I think there's a point here that's  
24 important, which is, it depends on whether the indirect  
25 network effects at the margin are important. So early on in

1 the life cycle of a platform, indirect network effects are  
2 important. Later on, once those have been exhausted, it no  
3 longer is an issue that's -- is relevant.

4 **Q.** And that's a market maturity theory of network effects, is  
5 it not?

6 **A.** No, that's exactly following the -- the literature where  
7 they look -- the pricing depends on the marginal indirect  
8 network effect.

9 **Q.** Well --

10 **A.** If that network effect has died off, then it no longer --  
11 the theory is that it no longer is a important part of the  
12 pricing of the platform.

13 **Q.** And the consulting team that you led in the *Sabre* case  
14 sponsored expert testimony by Professor Stiglitz that the  
15 network effects had died off in that particular market,  
16 correct?

17 **A.** That's right. That at the margin, this indirect network  
18 effect, the feedback between the two sides was no longer  
19 important in the sense that you had all the airlines and so an  
20 additional airline was not going to have an impact on how  
21 travel agents considered the platform and vice versa.

22 **Q.** And -- and your client was whom in that case?

23 **A.** U.S. Airways.

24 **Q.** And U.S. Airways prevailed at trial on that theory?

25 **A.** They did.

1 Q. And do you recall that Professor Schmalensee and Dr. Evans  
2 submitted an amicus brief urging reversal of that result?

3 A. I do.

4 Q. And do you recall the Second Circuit reversed?

5 A. They did, but not for the reasons that Professors Evans  
6 and Schmalensee were proposing.

7 Q. Well, we'll leave that to lawyers to figure out.

8 You believe all iOS game app transactions are identical  
9 substitutes with one another, correct?

10 A. Yes, from the perspective of the Apple App Store, you  
11 know, the rules apply to all of transactions and, you know,  
12 there -- there are different rules for some transactions, but  
13 it's the same set of rules that apply to all the transactions.

14 Q. Well, we've heard that a number of times. It's not  
15 correct that the same set of rules apply to all transactions,  
16 is it?

17 A. I -- there are a couple of negotiated outcomes.

18 Q. And -- and what are you referring to? Negotiated  
19 outcomes?

20 A. That Apple has negotiated with in some instances. And in  
21 other instances, they've chosen to apply the rules in a way  
22 that are inconsistent.

23 Q. Well, have you heard of the reader rule?

24 A. Yes.

25 Q. And what is the reader rule?

1     **A.** It allows for, as I recall, the downloading and reading of  
2     content.

3     **Q.** What kind of content?

4     **A.** I don't recall the specific description of what that  
5     applies to.

6     **Q.** Well, would you --

7     **A.** But I'd rather look at a specific rule rather than trying  
8     to, you know, do it from memory.

9     **Q.** Well, that -- that particular rule allows apps that fall  
10    under it to have content used within an iOS app even though it  
11    was purchased elsewhere without paying Apple a commission,  
12    correct?

13    **A.** That's my understanding.

14    **Q.** And that content does not apply -- that rule does not  
15    apply to all apps, correct?

16    **A.** It -- it falls -- it applies to all apps. To the extent  
17    that it differentiates between one app and another that meets  
18    the rule, some are going to -- it's going to apply to some  
19    that meet the rule and some that don't meet the rule.

20    **Q.** You're aware of the multi-platform rule, correct?

21    **A.** Yes.

22    **Q.** Can you explain what that is?

23    **A.** Well, I think of it in a number of different ways, the  
24    rules that relate to multi-platforms. There are some which  
25    relate to restrictions on how you can steer people. There are

1 other rules that allow for using currency for instance, in --  
2 in cross play. There are other rules that also relate to what  
3 you can advertise about pricing in other areas of the app  
4 ecosystem.

5 So by app ecosystem, I mean broadly speaking that if it  
6 were the case that you could go to a developer's website and  
7 download an app for cheaper, you wouldn't be allowed to  
8 advertise that.

9 **Q.** Well, the multi-platform rule is a rule that allows  
10 developers who are not subject to the reader rule to have --  
11 for example, as you say, a virtual currency that is paid for  
12 on another platform but used within the iOS app, correct?

13 **A.** Yes. I think I mentioned that.

14 **Q.** But that's another rule that does not apply to all apps  
15 equally, correct?

16 **A.** Well, it applies to all apps to the extent that you have  
17 designed your app to either, you know, use the exception or  
18 not.

19 **Q.** Now, you conclude that all nongame app transactions in the  
20 App Store are substitute for game app transactions, right?

21 **A.** Yes. From the perspective of this being a transaction  
22 market, as I discussed with Professor Evans -- not  
23 Professor -- Mr. Even -- Mr. Yanaton. Too many Evans floating  
24 around -- that, you know, the hypothetical monopolist test  
25 that I had thought about in terms of the substitutability of

1 app stores indicates that they're in the same market.

2 Q. Now in your direct, you said that the -- that you applied  
3 a hypothetical monopolist test and that it was the standard  
4 economic methodology?

5 A. Yes.

6 Q. Or words to that effect?

7 Now, isn't it true that there's no consensus among  
8 economists about the correct way to formulate and apply the  
9 hypothetical monopolist test to questions of market definition  
10 in two-sided markets?

11 A. That's right. So the hypothetical monopolist test is the  
12 adopted methodology, but for any implementation it's going to  
13 be a facts and circumstances implementation.

14 So, you know, sometimes it's a specific econometric  
15 analysis that lets you to do a sniff. Another time it could  
16 be the demonstration of a lack of substitution.

17 Q. The hypothetical monopolist test you've described was a  
18 thought experiment, in your words, right?

19 A. I -- it was an economic analysis of the market.

20 Q. You described it as a thought experiment in your  
21 deposition, didn't you?

22 A. Yes. In the sense of I didn't apply data to it, but  
23 rather applied economic analysis through the lens of my  
24 discipline which, you know, involves thinking about what could  
25 have happened in the hypothetical price increase.

1 Q. Now, you've -- you've read what the hypothetical  
2 monopolist entails in the -- in the Merger Guidelines, right,  
3 that's where it's taken from?

4 A. Well, the Merger Guidelines have adopted that.

5 Q. Right. And you understand that the hypothetical  
6 monopolist test requires you to assume a single firm was the  
7 only present and future seller of the relevant product,  
8 correct?

9 A. Yes. It -- the monopolized -- the -- the experiment is  
10 monopolized a set of products, the smallest set of products,  
11 and then ask is there the possibility of properly raising  
12 price.

13 Q. But your hypothetical monopolist test did not assume a  
14 single hypothetical seller of digital game transactions, did  
15 it?

16 A. I -- I imagined a single store.

17 Q. Well, in your written direct, you say you assume two  
18 hypothetical monopolists. Don't you recall that?

19 A. Yes, I had -- the experiment I was thinking of was a --  
20 one where you had one monopolist of games considering, you  
21 know, and -- and another monopolist of the rest of the market,  
22 the way I described it.

23 Q. Well, the rest of the market as you described it was  
24 another monopolist that sells other apps and game apps, right?

25 A. If that's what you're concluding, then I wrote it

1 inartfully. The way I described it earlier is exactly how --  
2 what I was trying to convey in that section.

3 Q. Well, let's take a look. This would be at your direct  
4 testimony, paragraph 21. I assume you've got a copy -- copy  
5 of that in front of you?

6 A. Yeah, I think it's in this binder.

7 Q. I'll bet you it is.

8 A. You bet me?

9 Q. Yeah, I do.

10 A. I'm not going to take the over/under on that.

11 All right.

12 Q. So you say here:

13 The direct way to answer the Court's question  
14 and test whether the distribution of games and  
15 distribution of non-games are in the same market is  
16 to imagine separate distribution channels for each  
17 and apply a sniff test to the game distribution  
18 channel, specifically consider a monopolist of game  
19 app distribution including iOS game app distribution  
20 versus a monopolist of general purpose app  
21 distribution that may distribute games too as the  
22 app store does.

23 A. Yes.

24 Q. You're assuming not a single seller of game apps, you're  
25 assuming a seller that sells only game apps and a seller that



1 sells game apps and other apps, correct?

2 A. Yeah, what I mean here --

3 Q. Correct, Doctor? Can you just confirm that?

4 A. Well, I'm trying to explain what I mean too --

5 Q. Well --

6 A. -- because I'm not sure you explained it right.

7 Q. Well, I was reading it.

8 A. Yeah. And it -- to the extent you don't understand it, I  
9 wanted to explain it.

10 Q. But is -- is this inartful?

11 A. I see what might be a -- a misreading that -- that -- what  
12 I have in mind is a general purpose store --

13 Q. Can we just find out --

14 A. -- that sell all transactions.

15 Q. Are there -- is there one or are there two sellers of game  
16 transactions in your hypothetical monopolist test?

17 A. There are one seller of what are called labeled game  
18 transactions and another general purpose store that's selling  
19 transactions.

20 Q. So this is --

21 (Simultaneous colloquy.)

22 THE WITNESS: What's that?

23 BY MR. SWANSON:

24 Q. This is a hypothetical duopolist test?

25 A. It's a hypothetical monopolist test for something called

1 games transactions. And I'm --

2 **Q.** So you --

3 **A.** -- asking can you differentiate a game transaction from  
4 other transactions.

5 **Q.** Well -- well, let's figure out how this works.

6 So you have one store that's a monopolist of game  
7 transactions and it raises the price of game transactions,  
8 correct?

9 **A.** Yes.

10 **Q.** And then you ask is there another source of competition  
11 that will keep that monopoly price from being sustained. And  
12 your imaginary hypothesis is that a second store that has game  
13 transactions in it along with other app for sale which is not  
14 raising price will constrain the game transactions in the  
15 first store.

16 **A.** Exactly. So the undifferentiated transaction store, what  
17 I'm calling a general purpose transaction store, disciplines  
18 the price of the store that is trying to label a set of  
19 transactions as game transactions.

20 **Q.** So your thought experiment says that game transactions  
21 can't be a relevant market because consumers and developers  
22 would turn to game transactions in another store.

23 **A.** That's right. They would shift what the monopolist is  
24 trying to label as a game transaction -- they would shift that  
25 to the general purpose store. Because there's no way to

1 differentiate transactions to constrain that description.

2 **Q.** So you're saying that retail gas couldn't be a relevant  
3 market because a hypothetical single seller of retail gasoline  
4 couldn't raise price because everyone would go to Costco which  
5 sells a lot of other things and gasoline.

6 **A.** No. So I think a better example in the gas context is to  
7 consider the lower prices that are sold to agricultural  
8 consumers, and, there, the way agricultural purchases of gas  
9 are identified is through coloring the gas.

10 So you've -- you've got colored gas versus uncolored gas.  
11 By differentiating them that way, you are able to sell at --  
12 at a lower price.

13 **THE COURT:** I have no idea what you mean by that.  
14 I'm sorry.

15 **THE WITNESS:** So in a -- in the real world, there are  
16 subsidies that allow for some gas to be purchased at a lower  
17 price than the retail price that's available to the two of us.

18 That gives the incentive for somebody who buys that low  
19 gas -- cost gas to resell it to us at a higher price. The way  
20 that is constrained from us purchasing it is by coloring the  
21 gas. So you and I can't buy red gas.

22 **THE COURT:** Mr. Swanson.

23 **BY MR. SWANSON:**

24 **Q.** Let's -- let's switch topics.

25 Dr. Cragg, you indicated that the popularity of games by

1 genre is a metric that determines users' ability to substitute  
2 across platforms. This was in your written direct. Do you  
3 recall that?

4 **A.** Sorry. I missed the beginning of that, if you could.

5 **Q.** Sure. You said in your written direct that the popularity  
6 of games by genre is a metric that determines users' ability  
7 to substitute across platforms. Do you recall that?

8 **A.** If you could point me to the specific paragraph? I don't  
9 remember that specific sentence.

10 **Q.** Paragraph 80, it's page 29 to 30 of your written direct.

11 **A.** (Reviewing document.)

12 **Q.** Are you there?

13 **A.** Yes.

14 **Q.** Now do you remember it?

15 **A.** I do.

16 **Q.** And do you recall Figure 11 which is on page 30?

17 **A.** I do.

18 **Q.** That was a -- a figure that you put together to depict  
19 various games within various genres on the various platforms?

20 **A.** That's right. So I'm taking the EEDAR data and  
21 identifying within the EEDAR characterization of games what  
22 the industry descriptions, how they correlate with the  
23 different platforms.

24 **Q.** And you point to the relative popularity of core,  
25 mid-core, and casual games, right?

1       **A.**   Yes.

2       **Q.**   Are you asserting that transactions for casual games in  
3       the App Store are not substitutes for transactions for core  
4       games and mid-core games?

5       **A.**   No.

6       **Q.**   You're not attempting to define submarkets, are you?

7       **A.**   No.   I'm -- I'm -- here I'm identifying that mobile  
8       devices for gaming purposes are used for a very different  
9       experience than a platform, and therefore the platform --  
10      sorry -- than a console and therefore the console and the  
11      mobile games aren't in the same market because consumers are  
12      looking to interact with -- with a device in a different way  
13      and therefore the -- the related stores aren't substitutes for  
14      each other.

15      **Q.**   Well, let's start with the -- with mobile.   Core,  
16      mid-core, and casual games you say are reasonably  
17      interchangeable on mobile, correct?

18      **A.**   Yes.   Those are all -- those games tend to be simple in  
19      the way they're played, and the duration of the way they're  
20      played is similar.

21      **Q.**   Well, you heard me, core, mid-core, and casual games --

22      **A.**   Oh, sorry.

23      **Q.**   -- are all reasonably interchangeable in the mobile  
24      environment, correct?

25      **A.**   I -- I apologize.   I didn't listen carefully enough to

1 your question. Core games are different than casual games.

2 Q. All right. Then let's take a step back because I asked  
3 you whether or not these were substitutes for each other, and  
4 I thought you said yes.

5 A. That's why I was -- I thought you thought I said yes, and  
6 that's why I was correcting myself.

7 Q. Let me -- let me ask you that question again then.

8 Are you asserting that transactions for casual games in  
9 the App Store are not substitutes for transactions for core  
10 games and mid-core games?

11 A. From the perspective of a transaction that is running  
12 through the App Store, they are substitutes.

13 Q. Thank you, Dr. Cragg.

14 All right. So core, mid-core, and casual games are  
15 available on each of the four indicated platforms, right,  
16 console, PC, mobile, and hand-held?

17 A. Yes.

18 Q. And puzzle games are casual games, right?

19 A. Yes.

20 Q. And you're aware that puzzle games are available on every  
21 platform, right?

22 A. Yes.

23 Q. In fact, the data underlying your summary says puzzles are  
24 the most popular games among mobile and PC users, correct?

25 A. I -- I'm not sure where you're seeing that but --

1 Q. Well, it's actually in your report, but it's also in the  
2 data. Do you need to look back to your report? Feel free.

3 Take a look at, I believe, paragraph 80.

4 So at the top of page 30, Figure 11 shows that casual  
5 games such as puzzle games are the most popular on iOS and  
6 mobile devices.

7 A. Yes.

8 Q. So that -- that reminds you of that conclusion, right?

9 A. Yes. I thought you had said consoles. So I may have  
10 misheard you. If I did, I -- I apologize.

11 Q. No. No worries.

12 Now, arcade games are available on every platform, right?

13 A. Yes.

14 Q. And, again, the data underlying your summary says arcade  
15 games are about equally popular among all of the devices,  
16 correct?

17 A. Where are you reading that? I just wanted to make sure  
18 I'm at the same place --

19 Q. Well, you did look at the underlying data for this  
20 document, right?

21 A. Yes. There's a lot of it.

22 Q. Okay. And my question is are you aware that the data  
23 underlying your summary says arcade games are about equally  
24 popular among every device?

25 (Simultaneous colloquy.)

1           **THE WITNESS:** I don't remember that quote. If you  
2 could show me the source, I could comment on it within its  
3 context.

4           **BY MR. SWANSON:**

5           **Q.** Simulation games are available on every platform, right?

6           **A.** I don't -- I can't read it on this diagram. And -- and so  
7 if the word "simulation" shows up on it in each category, the  
8 answer is yes.

9           **Q.** Well, the word "simulation," the word "strategy," skill  
10 and chance, battle royale, fighting games, racing games,  
11 they're all available on every platform, correct?

12           **A.** As I say, I don't -- I can't read the font here, but if --  
13 you know, if I -- if there -- if that's what's in each of  
14 those categories, the answer is yes. So it's a matter of just  
15 reading what's on the diagram.

16           **Q.** You've used several slides in your direct today that  
17 involve an analysis you made of play time on Fortnite when a  
18 consumer acquires a second device. Do you recall that?

19           **A.** Yes.

20           **Q.** And I believe the slides at issue here are Slides 7 and 8.

21           Those slides, that analysis, contains no study of the  
22 relationship between price and change in demand, correct?

23           **A.** That's right. The -- we don't observe that. So we're  
24 kind of doing the next best thing, which is asking the  
25 question of what happens when, you know, the -- the



1 opportunity set changes for the consumer.

2 Q. You identify when a consumer adds a second device.

3 A. Yes. When they start playing on a second device.

4 Q. So do you have any information about when that device was  
5 acquired or purchased?

6 A. We don't.

7 Q. You don't know whether the user had already owned the  
8 so-called second device even prior to beginning to play on the  
9 first device?

10 A. That's right. You -- you have to -- that's not available  
11 in the data, and so the next best thing is to look at how play  
12 changed.

13 Q. You made an assumption, right?

14 A. Sorry. I may have.

15 Q. You made an assumption that once an account was created  
16 for a second device, that that device had actually been  
17 acquired after the first device?

18 A. No, I didn't make the assumption. I understand the point  
19 you're making that we can't observe that specific event. And  
20 so to test the assumption of was this correlated with the  
21 purchase of a platform, there's not a way to test that within  
22 the Fortnite data.

23 Q. And you don't know the reason why the user began to play  
24 on the second device, correct?

25 A. That's right. There are some things that you observe in

1 the data. So for instance, the -- the season, the time of  
2 year, that type of thing. But beyond that, you know very  
3 little about the actual consumer.

4 **Q.** Do you agree that the relevant economic question here is  
5 not whether one device is substitutable for another device?

6 **A.** Yes. The -- the question is about the substitution of  
7 stores. And my understanding of why the Apple experts were  
8 focused on transactions was to be able to infer whether  
9 platforms are substitutes for each other and then make the  
10 next step of inferring if they are, then the stores are  
11 substitutes for each other.

12 **Q.** Now, game play which you studied with respect to these  
13 analyses in Slides 7 and 8 is not a transaction, correct?  
14 There's no payment associated with mere play, right?

15 **A.** That's -- that's right.

16 **Q.** In your rebuttal report, you said that you had analyzed  
17 consumers' expenditures on transactions in addition to their  
18 play time when they acquire another device, right?

19 **A.** Not in my final report. I amended the report.

20 **Q.** Yeah, we'll get to that. I'm asking you about your  
21 original rebuttal report. That's what you said, right?

22 **A.** Yes, and I corrected it.

23 **Q.** And -- well, let's -- let's walk through that sequence.

24 Now in your initial report, you didn't present any  
25 regression that you reported on consumers' expenditures,

1 correct?

2 **A.** Correct.

3 **Q.** That was your deposition testimony, right?

4 **A.** Yes.

5 **Q.** And then your counsel, after the deposition, served an  
6 errata deleting the reference in your report where you  
7 referred to a consumer expenditure analysis, correct?

8 **A.** That's correct.

9 **Q.** And that led to a motion to compel before Magistrate Judge  
10 Hixson, which was granted, and you were ordered to appear for  
11 a second deposition to clarify the confusion and discrepancy  
12 between your initial report, the deposition testimony, and  
13 your errata, right?

14 **A.** I had a deposition. I -- the -- all of the steps that led  
15 to the deposition, I was not part of the reasoning behind that  
16 so I can't comment on that.

17 **Q.** Well, you were part of the actual testimony at the first  
18 deposition, correct?

19 **A.** Yes.

20 **Q.** And --

21 **A.** But I -- I identify the -- the error.

22 **Q.** Well, Magistrate Judge Hixson said you didn't identify an  
23 error. Do you dispute that?

24 **A.** I -- I don't know what the Magistrate said.

25 **Q.** You didn't read his decision?

1     **A.** No. I just --

2     **Q.** Right.

3     **A.** I was told that there was another deposition on a narrow  
4     topic.

5     **Q.** And you testified in that second deposition that you  
6     didn't run any regression using expenditure instead of play  
7     time, right?

8     **A.** That's right.

9     **Q.** And you also testified -- and let me ask you if this  
10    remains correct -- that you don't know what the results would  
11    have been if you had done a regression using consumer  
12    transaction expenditures.

13    **A.** That's right. I haven't done that analysis.

14    **Q.** Dr. Cragg, when two products are complements, what happens  
15    to demand for the second product when the price of the first  
16    product goes up?

17    **A.** The -- the typical definition would be that the demand for  
18    the second product also goes down.

19    **Q.** Well, it -- it doesn't also go down. It goes down when  
20    the other goes up, right?

21    **A.** I thought you said when the price of the first goes up --

22    **Q.** Yes.

23    **A.** -- then if they're complements, the quantity consumed for  
24    both goods goes down.

25    **Q.** And do you agree -- well, let's take an example.

1 If the price of hot dogs goes up, the demand for hot dog  
2 buns goes down, right?

3 **A.** Yes.

4 **Q.** They're complements --

5 **A** No.

6 **Q** -- correct?

7 **A.** You'd have to do the analysis, but I certainly get the --  
8 you know, the notion that you're getting at.

9 **Q.** Is it your opinion that transactions in the Fortnite on  
10 mobile devices are complements for transactions in Fortnite on  
11 PC's?

12 **A.** I -- we'd have to look at -- sorry.

13 Could you repeat that one more time?

14 **Q.** Is it your opinion that transactions in Fortnite on mobile  
15 devices are complements for transactions in Fortnite on PC's?

16 **A.** So I generally --

17 **THE COURT:** Could you just answer "yes" or "no"  
18 before you explain?

19 **THE WITNESS:** I don't remember the sign on the  
20 regression.

21 **THE COURT:** Okay. Go ahead.

22 **BY MR. SWANSON:**

23 **Q.** Well, if -- if you have indicated they are complements,  
24 Dr. Cragg, is it your opinion that if the price of  
25 transactions in Fortnite increased on mobile devices, that

1 demand for Fortnite transactions would drop on PC's?

2 **A.** That would be my expectation. But as I say, I haven't  
3 done the analysis.

4 **Q.** That's your expectation?

5 **A.** Yeah, if they're complements, and the price on one  
6 platform -- or the first platform goes up, then the  
7 consumption on both platforms would go down.

8 **Q.** You -- ask you about a slide that you had on the launch of  
9 Fortnite on the Switch. This is in your -- the same figure as  
10 in your direct testimony at Figure 6, page 21. I don't know  
11 if we can put the slide up, but we can look at your report.

12 **A.** (Reviewing document.)

13 Sorry. Did you say Slide 21?

14 **Q.** No, I said --

15 (Simultaneous colloquy.)

16 **BY MR. SWANSON:**

17 **Q.** Looking at the figure in your report.

18 **A.** Oh. Oh.

19 **Q.** The same thing, Figure 6 on page 21.

20 **A.** Yes.

21 **Q.** So this is -- this is the figure that shows that the  
22 Switch release of Fortnite was on June 12th, 2018, right?

23 **A.** Yes.

24 **Q.** And then in the next month, July, there's a big jump up in  
25 total revenue. That's the first full month with the Switch,

1 right?

2 **A.** Yes.

3 **Q.** Is there anything else noteworthy about that month?

4 **A.** I believe there's a new release as well.

5 **Q.** There was a new season of Fortnite, correct?

6 **A.** That's -- I think that's right.

7 **Q.** And in fact, you can identify another new season of  
8 Fortnite by looking at this figure, correct?

9 **A.** I --

10 **Q.** There was another one in December, wasn't there?

11 **A.** Well, there are two effects happening.

12 **Q.** Could you just --

13 **A.** Well, I don't know -- so I don't know if there's a season  
14 release in December. But there's a seasonal pattern that's  
15 going on in the game for game consumption.

16 **Q.** Well, there's a pattern when Fortnite releases a new  
17 season, isn't there? Which is it attracts old players back --  
18 back to the game, for example, and it drives a surge in  
19 revenue; you know that, don't you?

20 **A.** Yes. Yes.

21 **Q.** All right. So that's what we're seeing in July of 2018,  
22 correct?

23 **A.** Yes.

24 **Q.** That's not a good test for whether or not Fortnite on  
25 Switch is a substitute for Fortnite on the other devices;

1 you'd agree with that, wouldn't you?

2 **A.** It's not a perfect test in the sense that, you know,  
3 looking at expenditures more directly is closer to the  
4 definition of -- of what an economic substitute and complement  
5 are.

6 **Q.** Well, let's see if we can find a better test.

7 Let's take the month before Fortnite was released on the  
8 Switch. That would be May. And that's actually handy because  
9 there's a -- there's a line there, May 2018 total. Do you see  
10 the total revenues? And that was for -- there's no Switch  
11 there, right? That was before Fortnite was released on the  
12 Switch?

13 **A.** That's right.

14 **Q.** So we're looking at that line there which again is the  
15 month before the introduction on the Switch.

16 If you look at September, that bar is almost exactly the  
17 same height as the bar in May, right?

18 **A.** Yes.

19 **Q.** This is after the introduction of Fortnite on the Switch,  
20 right?

21 **A.** Yes.

22 **Q.** And this includes revenues on the Switch, correct?

23 **A.** It does.

24 **Q.** So since it's actually just a smidge below the bar in  
25 May --



(Demonstrative published.)

**BY MR. SWANSON:**

**Q.** -- that implies and it includes revenues on the Switch that revenues on all the other platforms have declined, correct? That's math.

**A.** Yes. In aggregate, since they're very close to each other, the Switch consumption is, as you say, taking up some fraction of the total and pushing down the fraction of all else.

**Q.** It's taking share from all four other options here, isn't it? At least the visible ones. IOS is smaller than it was in May, correct?

**A.** It is, yes.

**Q.** And that's called substitution, isn't it?

**A.** It -- it could be. The issue is why I did the regression analysis of the time played as to control for, you know, the various factors that you can.

**Q.** Well, you told us that this figure supports your view, right? Without doing a regression analysis?

**A.** Yes. Around the event date, it does support my view. As you get further away from the event date, other things are happening.

**Q.** Dr. Cragg, you're familiar with the Brown Shoe factors for market definition?

**A.** You'll have to remind me of what those are.

1 Q. Well, for example, do you agree that industry recognition  
2 of a market's boundaries is relevant to market definition?

3 A. Oh, I see what you're saying. Yeah, there's some -- I do  
4 understand there are a number of factors that -- that can be  
5 pointed to.

6 Q. Okay. Well, at the time you wrote your expert report, you  
7 didn't know whether Google regards Google Play as a competitor  
8 to the App Store, correct?

9 A. I don't know how Google perceives itself relative to  
10 Apple.

11 Q. And you don't know whether Apple regards Google Play as a  
12 competitor of the App Store, right?

13 A. That's right.

14 Q. You didn't look into whether Sony regards the Playstation  
15 Store as a competitor of the App Store, right?

16 A. I -- when I was answering those questions -- look, I  
17 don't -- I don't know what their actual thinking is.

18 Q. And you don't know what Nintendo regards the Nintendo  
19 online store, whether it regards the Nintendo online store as  
20 a competitor of the App Store, correct?

21 A. I don't.

22 Q. Now you have an ongoing engagement with Microsoft, right?

23 A. Yes.

24 Q. And you told me at your deposition that you're relying on  
25 your continued work for Microsoft as part of the overall

1 experience you bring to this engagement, correct?

2 **A.** Yes.

3 **Q.** Now, that work for Microsoft includes studying every part  
4 of the company's portfolio, business, including the Xbox  
5 business, right?

6 **A.** I don't think I answered that question because it's  
7 confidential what parts of the business exactly we're  
8 studying. And so I described it as we're analyzing the  
9 company overall.

10 **Q.** Are you saying that the answer to my question is yes but  
11 that you weren't being accurate?

12 **A.** No. As I sit here today, I don't -- I think our  
13 confidentiality agreement with Microsoft would -- I don't have  
14 it in front of me, but I don't think it would allow me to  
15 answer with specificity what exactly we're analyzing in the  
16 business.

17 **MR. SWANSON:** Your Honor, do you need a copy of the  
18 deposition?

19 **THE COURT:** I have his deposition here, at least the  
20 first one.

21 **MR. SWANSON:** Oh, yes, it's -- it was already handed  
22 up.

23 Yes, that will do the trick. Well, we'll see.

24 We are looking at page 40, lines 16 to 23.

25 **THE COURT:** You may proceed.

1 **BY MR. SWANSON:**

2 **Q.** All right. Line 16, page 40:

3 "Q . Are you studying carefully every part of the company's  
4 portfolio businesses?

5 "A. Yes.

6 "Q . So that would include the Xbox business?

7 "A. As I -- as a -- as -- is your question --  
8 is -- is it one of Microsoft's portfolio  
9 products, yes. And I'm examining its entire  
10 portfolio of assets."

11 Now, Dr. Cragg, your work for Microsoft includes analyzing  
12 the competitive properties of the markets in which Microsoft  
13 participates, correct?

14 **A.** Sorry. I missed -- I didn't hear the beginning of the  
15 question.

16 **Q.** And your work includes analyzing the competitive  
17 properties of the markets in which Microsoft participates,  
18 your work for Microsoft?

19 **A.** Yes.

20 **Q.** And your work for Microsoft includes the pricing of  
21 Microsoft's whole portfolio of products, correct?

22 **A.** Yes.

23 **Q.** Now you stated at your deposition that because of your  
24 confidentiality agreement, you weren't able to answer certain  
25 questions about your work for Microsoft, correct?

1       **A.** That's right.

2       **Q.** You wouldn't answer questions about pricing, about  
3 competitive advantages held by Microsoft; is that correct?

4       **A.** Yes.

5       **Q.** Now, even though you have worked extensively for Microsoft  
6 and have access to confidential information that you will not  
7 share, you cannot say that Microsoft does not view the  
8 App Store as a competitor of the Xbox marketplace, right?

9       **A.** That's right.

10       **Q.** In fact, you testified at your deposition that you don't  
11 know whether the Xbox marketplace is viewed as a competitor of  
12 the App Store.

13       **A.** That's right.

14       **Q.** Let me switch topics. And flip pages.

15             So you indicated that it was your opinion that Apple  
16 has -- is it market or monopoly power?

17       **A.** I said monopoly power. And I was speaking as a -- in  
18 reference to the iOS transaction market.

19       **Q.** Is -- is that the relevant market that you have defined?

20       **A.** I'm following Professor's -- Evans' market definition  
21 there.

22       **Q.** Well, you indicated earlier that you didn't believe that  
23 the iOS operating system was a transaction platform, right?

24       **A.** Yes.

25       **Q.** Separate transaction platform. You don't believe that,

1 right?

2 **A.** That's right. Under the current conditions, there aren't  
3 transactions happening on iOS.

4 **Q.** And in -- in your opinion, when did Apple obtain monopoly  
5 power in the iOS transactions market?

6 **A.** I haven't identified that.

7 **Q.** When did Apple raise prices to a monopoly level, in your  
8 opinion?

9 **A.** I -- I've observed that the transaction prices rising, the  
10 commission rate as calculated by Professor Hitt is rising. I  
11 haven't identified whether that's -- you know, it's hit the  
12 maximum price that it could charge profitably.

13 **Q.** So in your opinion, Apple is not restrained by the glare  
14 of public scrutiny from raising prices in this market you  
15 define, correct?

16 **A.** Over the course of the last few months, I've observed  
17 Apple getting greater scrutiny. I don't know whether that's  
18 constraining its pricing or not.

19 **Q.** Do you agree that monopoly power is the power to raise  
20 price by restricting output?

21 **A.** That's one definition, yes.

22 **Q.** Do you agree that the App Store's explosive growth over  
23 the last decade is extraordinary?

24 **A.** Yes.

25 **Q.** Now, the Epic Game Store charges a 12 percent commission,

1 right?

2 **A.** Yes.

3 **Q.** And you concede that the Epic Game Store's 12 percent  
4 commission is below cost, right?

5 **A.** Below its current average cost.

6 **Q.** Now you have testified that Apple's prices have been  
7 increasing, correct?

8 **A.** I have.

9 **Q.** Did you read Dr. Evans' testimony, either his written  
10 testimony or his oral testimony?

11 **A.** I heard the oral testimony.

12 **Q.** Did you read his written testimony?

13 **A.** I didn't read it in its full -- you know, I didn't read it  
14 carefully.

15 **Q.** Well, did you recall in the oral testimony that Dr. Evans  
16 spoke to a slide he had about the reasons why Apple had  
17 monopoly power?

18 **A.** I don't remember that specific slide.

19 **Q.** Well, do you remember him talking about his fourth point  
20 on that slide which was stable pricing?

21 **A.** I don't remember that.

22 **Q.** Do you agree that Apple's pricing has been stable in the  
23 market that you've defined?

24 **A.** So I didn't hear his testimony. The commission rates have  
25 been stable.

1 Q. And in fact, you state in your written direct that while  
2 Apple's actual commission rates remain -- remain largely  
3 unchanged, Apple's average commission per download in dollar  
4 terms has dramatically increased. That's your view, right?

5 A. Yes.

6 Q. And that's what you depict in Slide 17, correct, that  
7 next-to-last slide we saw?

8 A. Yes.

9 Q. Now, you would agree, would you not, that the developer  
10 sets the price for in-app purchases?

11 A. Yes.

12 Q. And --

13 A. To some extent. There are limitations on how it can do  
14 that.

15 Q. They have to have a price that ends in 99, right?

16 A. Yes.

17 Q. Okay. Other limitations?

18 A. Well, that's a U.S. limitation. Then there are analogs in  
19 other currencies.

20 Q. And you -- did you hear Dr. Hitt's testimony earlier  
21 today?

22 A. I heard much of it. I didn't -- I didn't hear the  
23 redirect.

24 Q. Okay. And -- and you've seen his written direct?

25 A. Yes.



1 Q. You read that.

2 And you've seen his exhibit showing that from 2009 to  
3 2019, developers on average increased the amount charged for  
4 in-app purchases by 4- to 500 percent.

5 A. I -- I do recall him presenting an increase in the prices  
6 charged by developers. I just don't remember the numbers.

7 Q. Well, that increase in prices by developers is the reason  
8 why you say that Apple's dollar value commission on in-app  
9 purchases has increased dramatically, is it not?

10 A. That's right. The -- the IAPs are the product of a  
11 percentage and the -- the final consumer price.

12 Q. Have you assessed the average price of a game app download  
13 on the Epic Games Store?

14 A. No.

15 Q. Well, you -- you looked at prices on consoles and you  
16 talked about it and -- and PC's, right? You talked about that  
17 in your written direct?

18 A. Yes.

19 Q. Prices -- prices --

20 A. Yes.

21 Q. -- of download, right?

22 And isn't it true that the average price of a game app  
23 download on the Epic Games Store would be in the neighborhood  
24 of \$25?

25 A. Of a -- of a game or a in-app purchase?

1 Q. Of a game.

2 A. Oh, I -- I haven't looked at what the average price is for  
3 app downloads in the store.

4 Q. Okay.

5 So you don't know what commission Epic would attain in  
6 absolute dollar terms when that 12 percent commission is  
7 applied, right?

8 A. I don't.

9 Q. But if the average price of a game app download is \$25,  
10 Epic's commission would be \$3, right?

11 A. Yes.

12 Q. And \$3 is more than Apple charges for an -- an average  
13 download, correct?

14 A. I don't remember the relative numbers.

15 Q. Well, it's in your report. Turn to your direct report at  
16 paragraph 83, page 31.

17 A. (Reviewing document.)

18 Paragraph 83, you said?

19 Q. Yes.

20 A. Yes.

21 Q. Do you -- do you see the figure there, less than a dollar?

22 A. Oh. I see that the average pay to iOS game download is  
23 49 cents.

24 Q. Right. And 30 percent of that is 16 cents, right?

25 A. That's right.

1 Q. All right.

2 MR. SWANSON: No further questions, Your Honor.

3 THE COURT: Redirect?

4 REDIRECT EXAMINATION

5 BY MR. EVEN:

6 Q. Dr. Cragg, you were asked couple of questions about what  
7 happens in the interplay between PC's and Fortnite if price  
8 goes up on one and what happens on the other. Do you recall  
9 that?

10 A. I -- I recall discussing not the price of a PC and the  
11 price of Fortnite, but rather the price of Fortnite across  
12 platforms.

13 Q. And if I misspoke, I apologize.

14 So if the price of Fortnite transaction on iOS goes up,  
15 what would that -- how would that affect consumption of  
16 Fortnite on iOS?

17 A. It would lead to a reduction in iOS purchases.

18 Q. And so the people who play PC, Fortnite on PC, and whose  
19 best friends play Fortnite on iOS, what's going to happen to  
20 them?

21 A. Well, those -- you know, the types of purchases, you know,  
22 reduces the -- the quality of experience and so it would go  
23 down.

24 Q. And that's how complementarity works, correct?

25 A. Yes.

1 Q. Your -- strike that.

2 Have you ever done any transfer pricing work?

3 A. I have.

4 Q. Including for DOJ?

5 A. Yes.

6 Q. And did that involve IP?

7 A. Yes.

8 Q. Okay. And the line on your resume says that you've done  
9 work for corporations, the FTC and DOJ in antitrust and IP,  
10 correct?

11 A. I don't remember but --

12 Q. Okay.

13 A. -- I represented to the Judge that I would make sure that  
14 what's on our website is accurate.

15 MR. EVEN: Thank you, Dr. Cragg.

16 No further questions in open.

17 THE COURT: Anything on his -- on those two  
18 questions?

19 MR. SWANSON: No. Nothing further, Your Honor.

20 THE COURT: Okay.

21 With respect to the other issue, we can move into sealed  
22 session. There's only 15 minutes left of today's proceedings  
23 in any event.

24 I believe what I had done in pretrial order 4 was that

25 I --

1           **THE CLERK:**   Should I --

2           **THE COURT:**   -- overruled the objections that Apple  
3       had to Mr. Cragg's report, but I did seal, I believe, the --  
4       the figure that we're discussing.

5           Let me just say, and you've heard me ask questions of many  
6       witnesses throughout this trial, that I frequently ask for  
7       what is the source material. Sometimes I get data. Sometimes  
8       I don't.

9           I think it is prudent to allow the information to come in,  
10      and then with the luxury of more time to evaluate the basis of  
11      all these opinions, and then ultimately I'll have to put all  
12      of this obviously in an order. And any appellate courts can  
13      then see it as well.

14          So I think that I will allow the testimony. That doesn't  
15      mean that I will find it ultimately persuasive. And you can  
16      cross him on the source of his information. And I will  
17      consider that just as I will consider the timing of events,  
18      the lack of disclosure of information. I will do all of that  
19      in due course.

20          But it is not prudent, I think, to do it on the fly. I  
21      think it is better to have it in the record.

22          Okay?

23          So we will go into closed session at this juncture.

24          For those listening, we will start again tomorrow, as  
25      always, at 8:00 a.m.

1           So I'd ask the reporters if they could please leave at  
2           this point. Thank you for being here.

3           And counsel can stay from the class actions.  
4           Mr. Harrington, you can stay in the courtroom, sir.

5           **MR. HARRINGTON:** Thank you, Your Honor.

6                               (Pause in the proceedings.)

7           **THE CLERK:** I have both the listening lines are now  
8           in the waiting room.

9           **THE COURT:** Okay.

10           You can actually -- well, that's fine.

11           All right. The courtroom is sealed.

12           (The transcript at pages 2335 through 2346 are under seal.)

13                               (Open Court proceedings adjourned at 3:24 p.m.)  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

**CERTIFICATE OF REPORTERS**

We, Diane E. Skillman, Pamela Batalo-Hebel, and Raynee Mercado certify that the foregoing is a correct transcript from the record of proceedings in the above-entitled matter. We further certify that we are neither counsel for, related to, nor employed by any of the parties to the action in which this hearing was taken, and further that we are not financially nor otherwise interested in the outcome of the action.

\_\_\_\_\_/S/DIANE E. SKILLMAN\_\_\_\_\_

Diane E. Skillman, CSR, RPR, FCRR

\_\_\_\_\_/S/ PAMELA BATALO-HEBEL\_\_\_\_\_

Pamela Batalo-Hebel, CSR, RMR, FCRR

\_\_\_\_\_/s/ Raynee Mercado\_\_\_\_\_

Raynee Mercado, CSR, RMR, FCRR

Thursday, May 13, 2021